DOUGLAS WATER MASTER PLAN



Wyoming Water Development Office

City of Douglas Wyoming
Home of the Jackalope. We Know Jack.

HDR

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CDLidstone LLC
Geology & Water Resource Consulting

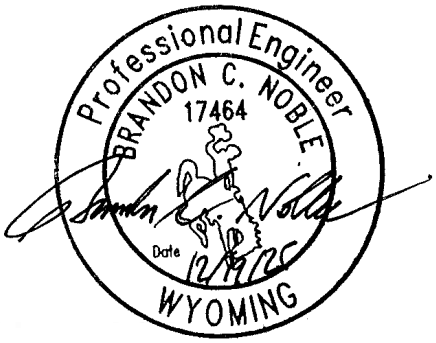
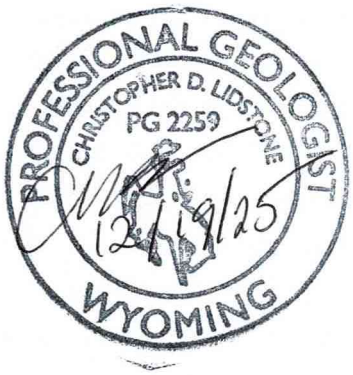
Brandon Noble, PE License No. 17464 	The seal and signature to the left applies to the entire Master Plan, except for hydrogeologic sections.
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Table of Abbreviations

Abbreviation	Definition
A&I EAD	Administration and Information Economic Analysis Division
Ac.-ft/yr	Acre Feet per Year
ACT	As Changed To
ADD	Average Day Demand
AF	Acre Feet
BGS	Below Ground Surface
BRC	Business Ready Community
BRIC	Building Resilient Infrastructure and Communities
CB	Chalk Buttes
CEPI	Civil Engineering Professionals Inc.
CIP	Capital Improvements Plan
CF	Clearfield
CFS	Cubic Feet per Second
CR	Certificate of Record
CT	Chlorine Treatment
DIP	Ductile Iron Pipe
DWSRF	Drinking Water State Revolving Fund
EOPCC	Engineer's Opinion of Probable Construction Cost
EPA	Environmental Protection Agency
EPS	Extended Period Model Simulation
ESA	Endangered Species Act
ET	Evapotranspiration
ft	Foot/Feet
Ft2	Square Foot
GIS	Geographic Information System
GPCD	Gallons Per Capita Day
GPD	Gallons Per Day
GPM	Gallons Per Minute
GWR	Ground Water Rule
I&Cs	Instrumentation and Controls
IIJA	Infrastructure Investment and Jobs Act
in	Inch

Abbreviation	Definition
IUP	Intended Use Plan
Kc	Crop Coefficient
L	Liter
LA	Land Area
LBES	Little Box Elder Spring
LCR	Lead and Copper Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
mg	Milligram
MG	Million Gallon
MGD	Million Gallons a Day
mrem	Milli Roentgen Equivalent Man
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDC	North Platte Decree Committee
NPDWR	National Primary Drinking Water Regulations
NPR	North Platte River
NSDWS	National Secondary Drinking Water Standards
NTU	Nephelometric Turbidity Unit
OR	Order of Recordation
pCi	Pico Curie
PF	Plant Factor
PFAS	Per- and Polyfluoroalkyl Substances
PHD	Peak Hour Demand
PHF	Peak Hour Factor
PMP	Pathfinder Modification Program
PRRIP	Platte River Recovery Implementation Program
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PSV	Pressure Safety Valve
PVC	Polyvinyl Chloride
Re	Effective Rainfall
RUS	Rural Utility Service
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act

Abbreviation	Definition
SEO	State Engineers Office
SERP	State Environmental Review Process
SMW	Sheep Mountain Well
SWTR	Surface Water Treatment Rule
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
UC	University of California
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
ug	Microgram
UPRR	Union Pacific Railroad
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGA	United States Golf Association
WLEA	Wyoming Law Enforcement Academy
WRDS	Water Resources Data System
WTP	Water Treatment Plant
WWC	Western Water Consultants
WWDC	Wyoming Water Development Commission
WWDO	Wyoming Water Development Office
WYDOT	Wyoming Department of Transportation
Yr	Year

1.0 Review of Existing Information

A review of existing information developed since the 2010 City of Douglas Water Master Plan has been conducted. This review covers data from 2011, the year following the previous plan, to the present day. The following sections describe the available data that was collected and its relevance to the 2025 City of Douglas Water Master Plan. Review of the collected data informed key decisions and analyses performed throughout the development of the current master plan, helping to develop recommendations for this update.

1.1 Previous Studies

Since 1998, four Wyoming Water Development Commission (WWDC) studies have been completed for the City of Douglas. Following is a list of known studies, which are all available through the University of Wyoming's Water Resources Data System (WRDS) Library:

1. City of Douglas Water System Master Plan Level I Study, Final Report (July 1998 - The Sear-Brown Group)
2. Douglas Water Supply Rehabilitation Project Level II Study, Final Report (October 1999 - Civil Engineering Professionals, Inc.)
3. Douglas Ground Water Level II Study, Final Report (July 2008 – Weston Engineering)
4. Douglas Master Plan Level I Study, Final Report (September 2010 - Dowl HKM)

These studies recommended various projects aimed at improving the quality of the City's water system infrastructure. Each of these studies recommended different improvements, which are detailed in the next section.

1.2 Status of Past Recommendations

Table 1, shown below, lists the recommendations from the 1998 Master Plan, 2008 Groundwater Study, and the 2010 Master Plan and the status of each project recommended. There are no recommendations from the 1999 Rehabilitation Project Study (Civil Engineering Professionals Inc., 1999), as its recommendations were redundant to those within the 1998 Master Plan. These included small improvements to Little Box Elder Spring (LBES) and lightning protection for Sheep Mountain Well (SMW).

Many of these projects have been completed via multiple funding sources. Several have been completed due to Level 3 funding efforts, including the rehabilitation of the LBES house, assessment of non-disinfected water usage outside of city limits, and replacement of the transmission line from LBES to Douglas. Other projects were funded through the city's budget, including replacing the wooden columns on the Cemetery tank.

Recommended projects are categorized as follows: Water Supply Upgrades, Water Quality Considerations, Distribution/Transmission Rehabilitation, Pressure Zones, Fire Protection, Water Storage, Pump Stations, NPR Analysis, Level 3 Funding, and other improvements.

Table 1. Status of Previously Recommended Projects

Study	Category	Location	Project	Year	Status	Notes
1998 Master Plan (The Sear-Brown Group, 1998)	Water Supply	LBES	Rehab of pipeline flow control valve	2020	Complete	Level III
			New flow recording devices at spring house	2015	Complete	Level III
			Roof repair to LBES house	2015	Complete	Level III
			Redesign of LBES house	2015	Complete	Level III
		SMW	Lightning protection for tank level transducer	2003	Complete	
			Piping changes to accommodate better sampling		Complete	Sampling in building
	Water Quality Considerations	WTP	Review turbidity removal rates, inspect media, test filters	N/A	Not complete	WTP refurbished in 2008
			Eval polymer chems and filter performance for turbidity, TOC removal and disinfection byproducts	N/A	Not complete	WTP refurbished in 2008
			CT analysis of chlorine contact basin	N/A	Not complete	WTP refurbished in 2008

Study	Category	Location	Project	Year	Status	Notes
	Distribution/Transmission	Douglas Pipeline No 1	Address negative pressure zones by realigning pipe or adding pump station at spring	2020	Complete	Level III
			Replace flow meter and install test ports and valves for testing/calibration	2021	Complete	Level III
			Determine non-disinfected water usage between LBES and splitter box at city	2022	Complete	Level III
			Implement valve exercising program and regular maintenance and inspection program	N/A	Not complete	No program
		SMW Transmission Main	Implement valve exercising program and regular maintenance and inspection program	N/A	Not complete	No program

Study	Category	Location	Project	Year	Status	Notes
			Investigate negative pressure zone at 196+00	N/A	Not complete	Corrected
		Various	Install check valve on 12-inch line at Orpha and city connection	N/A	Not complete	Not needed
			Upsize Ridgewater lines to provide required flow		Complete	Private system
			Continue 12-inch line in Wind River Drive south to alleviate demand on existing lines at old POW camp		Complete	
			Construction of 12-inch pipeline to serve Fairfield Estates	N/A	Not complete	Fairfield did not annex
	Pressure Zones	Various	Connection between Clearfield zone and Fairview development	N/A	Not complete	Fairfield did not annex
			Addition of three new pressure zones (Airport, Windmill, and River Bend)	N/A	Not complete	Not needed

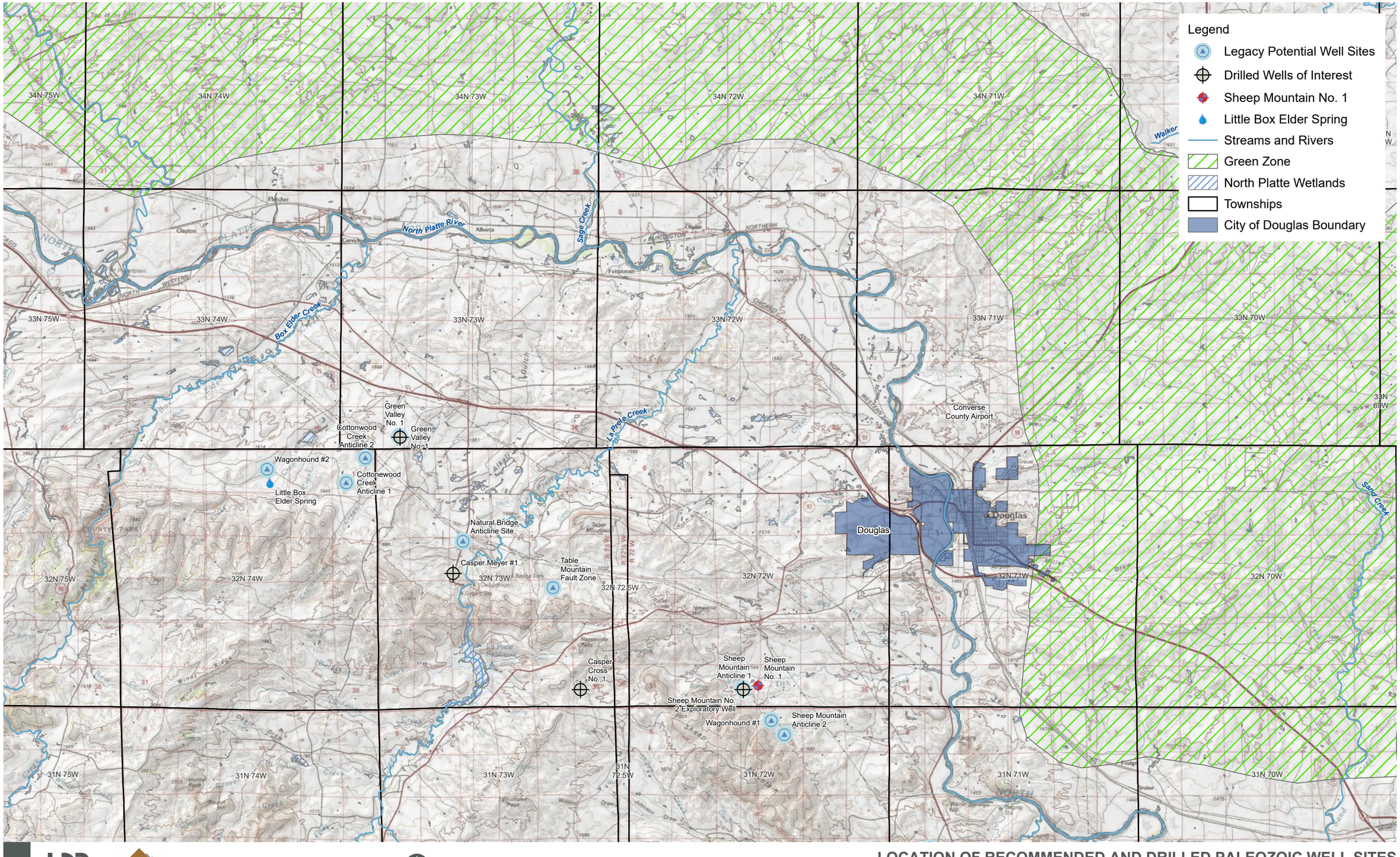
Study	Category	Location	Project	Year	Status	Notes
	Fire Protection	Various	Test all hydrants to make sure proper flow is attained	Current	Complete	Program established
	Water Storage	Orpha	Recoat 3 MG Orpha tank	2002	Complete	
			Remove 1 MG Orpha tank	2002	Complete	
		Various	Replace Clearfield tank	N/A	Not complete	Not needed
			Replace wooden columns of Cemetery tank	2002	Complete	
		Construction	Construct 1.5 MG tank for SMW	N/A	Not complete	Not needed
			Construct 1.5 MG tank for Airport pressure zone	N/A	Not complete	Zone does not exist
			Constrict 0.5 MG tank for Windmill pressure zone	N/A	Not complete	Zone does not exist
	Pump Stations	WLEA	Remove WLEA pump station after pipe upsizing to facility	2003	Complete	Replace pump station
		Various	Increase capacity of Clearfield and SMW boosters	2025	In progress	CF booster to be replaced

Study	Category	Location	Project	Year	Status	Notes
			Construct pump stations for Airport and Windmill pressure zones	N/A	Not complete	Pressure zones do not exist
2008 Groundwater Level 2 Study (Weston Engineering, 2008)	Improvements	LBES	Make site improvements around the LBES house	2015	Complete	Level III
			Replace or repair the LBES house	2015	Complete	Level III
2010 Master Plan (Dowl HKM, 2010)	Level 3 Funding	Various	Rehab LBES house	2015	Complete	Level III
			Replace spring transmission line	2020	Complete	Level III
	NPR Analysis	Platte River	Work with Platte River coordinator to ensure accurate depletion reporting		Complete	
		SMW	Request for surface water connectivity determination from NPRC for SMW	2015	In progress/stalled	Draft completed 2015
			Test SM Anticline for redundant water supply	2024	In progress	Level II test well

Study	Category	Location	Project	Year	Status	Notes
	Water Quality	WTP	Implement baffles or tube settlers in pre-sedimentation basin for better settling	N/A	Not complete	Study determined no settlers needed
			Relocation of tap test location due to air entering pipe (Turbidity spiking)	2020	Complete	

1.3 Previous Geologic Investigations

Well-siting studies have been conducted within the study area to identify suitable locations for water supply wells targeting the Paleozoic aquifer system. In addition, several reports summarize various Paleozoic water supply drilling programs that have been conducted in the area. Major studies evaluated as part of the literature review for this project are summarized below. The studies recommended various prospective drill locations known as “legacy potential well sites.” These legacy sites and the actual well locations are illustrated in Figure 1.



\\SXF-SRV01\ENGIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_10399642\7.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 5/20/2025

Figure 1. Location of Recommended and Drilled Paleozoic Sites

LOCATION OF RECOMMENDED AND DRILLED PALEOZOIC WELL SITES

DOUGLAS, WY

1.3.1 Banner Associates, Inc. (Banner), 1980

The 1980 Banner study summarized a test well drilling program conducted between 1973 and 1975 for the Panhandle Eastern Pipeline Company. The Green Valley No. 1 Well (P70820) was drilled and completed in Madison Limestone in the northwestern part of the study area, reaching a depth of 6,700 feet. The top of the Casper Formation was encountered at 5,638 feet below the ground surface (BGS).

Because the initial aquifer test yielded poor results, the well was acidized to increase production potential. The pre-acidizing results indicated a drawdown of 880 feet after pumping at a rate of 265 GPM for two days. The post-acidizing results indicated a drawdown of 530 feet with a pumping rate of 435 GPM after two days. The transmissivity was calculated at 1,100 GPD/foot (147 ft2/day).

Water samples collected from the well indicated that the quality was poor with total dissolved solids (TDS) ranging from 1,052 to 1,974 mg/L (Banner Associates, Inc., 1980). Due to high concentrations of calcium, sodium, sulfates, and bicarbonates, the water was not considered potable and the State Engineer's Office (SEO) permit (UW 24517) for the well was subsequently cancelled.

The well has since been re-permitted for production under permit number P70820. The current applicant for the well permit is Green Valley, a Wyoming Corporation, with William E. Barber listed as president. According to the SEO Statement of Completion, the amount of water pumped is 126 GPM. The groundwater right for this well is 60 GPM and the water is pumped to a nearby reservoir.

The well was drilled in the La Prele Groundwater Compartment and would be useful as a Paleozoic Aquifer groundwater monitoring well.

1.3.2 Western Water Consultants, 1982

The 1982 Western Water Consultants (WWC) well siting study targeted the Paleozoic aquifer system, an area that includes the north and south flanks of the Laramie Range as well as the Hartville Uplift. The study identified two favorable sites within the study area for this project. Criteria used to screen the sites included drilling depth, water quality, geologic structure, and favorable aquifer parameters (Western Water Consultants, 1982). The well sites were located in the La Prele Groundwater Compartment.

1.3.3 James M. Montgomery, Consulting Engineers, Inc., 1987

As part of a WWDC–funded project, James M. Montgomery oversaw the drilling of two wells in the vicinity of Ayres Natural Bridge State Park in 1983. The first well, Casper Cross No. 1 (P65126), was dry and later abandoned. It was drilled to a depth of 930.5 feet, with the first water bearing zone (pink sandstone) encountered near the total depth of the well.

The second well, the Natural Bridge Well, also referred to as Casper-Myer No. 1 (SEO Permit No. U.W. 65885), was successful. This well was drilled to a depth of 901.5 feet and was an open hole (16-inch diameter) below 197.5 feet (JMM Consulting Engineers, 1987). It was permitted as miscellaneous use for observation and testing. There is no water right associated with this well.

Four to five main water-bearing zones of intense fracturing associated with deformation along the crest of the anticline were identified in the lithologic and geophysical logs. In August 1986, ARIX, on behalf of the City of Douglas, petitioned the SEO to conduct an aquifer test on the Casper-Myer No. 1 test well. A 24-hour aquifer test conducted at a rate of 2,200 GPM indicated a long-term transmissivity of 38,000 GPD/foot (5,080 ft2/day) and a storage coefficient of 10-4. The two wells were drilled in the La Prele Groundwater Compartment, specifically in Township 32 North, Range 73 West, NE1/4 of the NW1/4 Section 36 (Casper Cross No. 1) and SW1/4 of the SW1/4 Section 16 (Casper-Myer No. 1). The status of Casper-Myer No. 1 is unknown. This well is located about 4,100 feet south of the Natural Bridge Anticline site and would be useful as a Paleozoic Aquifer groundwater monitoring well.

1.3.4 TriHydro Corporation and Lidstone and Associates, Inc., 2007

In 2007, TriHydro Corporation and Lidstone and Associates, Inc. prepared a report for the WWDC to identify groundwater prospects in southeast Wyoming. The study aimed to identify potential water sources to augment the North Platte River Basin. It detailed well sites in both the La Prele and La Bonte Groundwater Compartments; however, these wells were not within the Green Zone – the "Green Zone" refers to groundwater sources that are not hydrologically connected to the North Platte River Basin. The report also detailed other sources of groundwater augmentation that were not considered tributary to the NPR, which included the Fort Union Scoria Aquifer (TriHydro Corporation & Lidstone and Associates, Inc, 2007). The water from these wells would have been conveyed to the series of rivers that are tributary to the NPR.

The proposed location of the well is located in Sections 32 and 33, Township 38 North, Range 67 West, in Converse and Niobrara Counties. The anticipated production from a well in these areas was 500 GPM.

1.3.5 Weston, 2008

In 2008, Weston prepared a report for the WWDC to investigate potential improvements the City of Douglas could implement to prevent the LBES from being designated as Ground Water Under the Direct Influence of Surface Water. The report discussed the area's geology and hydrogeology and includes the drilling of a test boring conducted in 2002 at the Little Box Elder Well No. 1 (P198039.0W).

The test boring and completed well (Little Box Elder Well No. 1) were drilled as part of a Level III Water Supply Project funded by the WWDC and the City of Douglas. The well was to be used to supply water to the City of Douglas during the rehabilitation of the LBES. The well was drilled to 1,170 feet bgs, with an open borehole between 344 and 1,170 feet. The well produced an artesian flow of 26 GPM when the well reached 790 feet (Weston Engineering, 2008).

The well was drilled near the LBES in the La Prele Groundwater Compartment. The water right status is "incomplete", and the well appropriated volume of groundwater is 600 GPM. This well could also be considered as useful as a Paleozoic Aquifer groundwater monitoring well.

Little Box Elder Well No. 1 was completed in the Casper Formation, Madison Limestone, Englewood Formation (non-water bearing), and Fremont Canyon Sandstone. The top of the Casper Formation was encountered at 14 feet and Precambrian amphibolite rocks were encountered at the bottom of the well. The well was completed as an open hole from 344 to 1,170 feet. The well was air developed, but no record of the airlifting or production was available. The well was also geophysically logged using caliper, gamma ray, S.P. and resistivity to a depth of 1,077 feet. The open borehole is 9 to 10 inches in diameter. The 85,000-foot LBES pipeline can carry a maximum flow of 1.81 MGD (1,257 GPM). The pipeline terminates at the City of Douglas Water Treatment Plant (WTP).

A step-rate test and constant-rate (500 GPM) aquifer test were conducted between January 2nd and January 5th, 2003. The static water level at the beginning of the aquifer test was 125 feet. At 1,600 minutes, the water level in the spring house had dropped by one inch. The maximum drawdown of about 86 feet at the pumping well occurred at the end of the test, approximately 58 hours after the test was started. The specific capacity of the well at the time it was aquifer tested was 24 GPM/ft of drawdown.

1.3.6 Dowl-HKM, 2010

In their 2010 WWDC Douglas Master Plan Level I Study, DOWL-HKM identified two potential well sites in the La Prele Groundwater Compartment and five in the La Bonte Groundwater Compartment.

DOWL-HKM also evaluated groundwater prospects using criteria such as predicted water quality, estimated depth of the Paleozoic Aquifer and required well depths, land ownership, potential well interference, access, and estimated pipeline length. DOWL-HKM concluded that the Sheep Mountain Anticline Site 1 would be the best option.

Notably, none of the well site selection criteria considered the hydrogeologic conditions at each site, as all the groundwater prospect sites targeted the same

aquifer system (Casper/Tensleep and Madison). The critical factor was the location to an existing transmission line. However, a review of the aquifer test transmissivity and flow rates suggest the Paleozoic Aquifer hydrogeologic conditions vary considerably, possibly due to fracturing.

1.4 Other Recently Completed Projects

The City has implemented many projects since 2010 that were not included as recommendations in any of the previous studies. These projects are summarized below in Table 2.

Table 2. Recently Completed Projects

Name	Year	Project Type
Griffith Way and Russell Avenue	2010	Distribution
Misc - Leal Street and North 6th Street	2013	Distribution
Misc - Washington Park, Cedar Street, and North 9th Street	2014	Transmission/ Distribution
Little Box Elder Spring House Rehabilitation	2015	Spring Building Rehab
Richards Street	2015	Transmission
Poplar Street and North 7th Street	2018	Transmission/ Distribution
Elm Street	2018	Distribution
Springline Replacement	2020	Transmission
Oak Street	2020	Transmission
North 5th Street	2020	Distribution
Wind River Drive	2021	Transmission
North 8.5 Alley and 9th Street	2022	Distribution
South 4.5 Alley.	2022	Distribution
Pearson Street	2022	Distribution
North 2nd Street and North 3rd Street	2023	Distribution
Teton Way	2024	Distribution
South 3.5 Alley	Current	Distribution
Adams Street	Current	Transmission/ Distribution
Information Provided by CEPI (Civil Engineering Professionals Inc., 2024)		

1.5 Service Area and Planning Review

Multiple sources were used to estimate the current service area of the City of Douglas. The appendix of the 2019 City of Douglas Housing Plan provided an estimate for the City's total service area, indicating that 18.9% of the land was classified as open land (Community Partners Research Inc, 2019). Most of the land that was not in use was designated as vacant residential land.

In 2019, Converse County had Community Partners Research Inc. complete a housing study for the City of Douglas and the rest of the county. The study indicated that there was only a small portion of housing that was not inhabited. It also stated that there were plans to develop sections of the City to accommodate more housing in the coming years, adding approximately 20 units a year until 2025.

To support this data, a future land use map was obtained from the City planner to assess the current state of Douglas' growth. According to the map, there are plans for multiple developments in the City, including the John Lambert Subdivision to the south and the Seven Trails Addition to the west (Logan Simpson Design Inc., 2014). Both expansions are zoned for residential and general business developments, along with open/green space. Based on the future land use map and the Converse County GIS map, there is room for a large expansion for the City. Figure 2 shows the GIS zoning data in map format.

Zoning District
A
B-1
B-2
CB-1
Greenway
Industrial
MH-1
MH-2
MU-PUD
PLI
R-1
R-2
R-3
R-4
RE
N PLATTE RIVER
59
93
91
87
20
94
25
26
Cold Springs Rd
Riverbend Dr
N Riverbend Dr
W Yellowstone Hwy
S Riverbend Dr
S Windriver Dr
Pearson Rd
W Richards St
Esterbrook Rd
Smylie Rd
Brownfield Rd - Co Rd 61
S 5th St
Hamilton St
E Antelope Rd
Co Rd 52
Coulter Trl
Richards St
Fairway Dr
Co Rd 9
Chalk Buttes Rd
Ridgewater Rd
N PLATTE RIVER
0
0.5 mi
DOUGLAS ZONING
\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039964207.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 11/20/2024
DOUGLAS, WY

Figure 2. City of Douglas GIS Zoning Data

Table 3 below elaborates on the zoning codes used in Figure 2.

Table 3. Zoning Code Definitions

Code	Definition
A	Agriculture
B-1	Local Business
B-2	General Business
CB-1	Downtown Business
Greenway	Greenway
Industrial	Industrial
MH-1	Manufactured Home Single Residence
MH-2	Mobile Home Park
MU-PUD	Mixed Use-Planned Unit Development
PLI	Planned Light Industrial
R-1	Residential
R-2	Multiple Residences
R-3	Multiple Residences
R-4	Multiple Residences
RE	Residential Estates
Adapted from (Greenwood, 2025)	

The zoning data indicates that both the Seven Trails addition as well as the Lambert subdivision are still planned to be added, which currently aligns with city plans. Using the Douglas Master Plan from 2019, the Seven Trails addition that is south of Interstate 25 will consist of multiple residences and residential estates (Community Partners Research Inc, 2019). The rest will be green space and open area.

After coordinating with the City planner, it was established that the northern part of the addition, on the intersection of Highways 93 and 59, is currently being developed with a mix of business and high-density residential housing. There are plans to build a hotel and gas station in the southern part of this area. The City planner also indicated that most of the addition south of Interstate 25 will take place after the north is developed.

For the Lambert subdivision, Converse County plans to develop the area after all major utilities (water, sewer, electric) are installed. The proceeding section describes potential demands on the Douglas water system.

2.0 Population and Water Demand Projections

The purpose of this section is to help support planning efforts for future system improvements and additional water source acquisitions.

HDR performed a review of the population projections from previous master plans developed for the City of Douglas. Previous projections were applied to data taken from the Wyoming Office of Administration & Information - Economic Analysis Division (A&I-EAD) to reflect current population levels. As part of the master planning process, HDR evaluated several different scenarios for the population growth.

To develop population projections, multiple scenarios were considered under which an increase in population might occur. Hard points in population growth were also compared against water use per capita. This approach ties planning in population growth to total available water supply, which conveys the points at which water use will necessitate improvements in system efficiency or additional water sources to be secured for the City. These estimates assume growth and water usage will follow similar trends and remain constant for the next 50 years.

2.1 Historic Population Data

The 2020 U.S. Census reported the population of Douglas at 6,386. Except for significant increases in population during the City's infancy and during a natural resource boom in the 1970s, Douglas' population has increased at a relatively constant rate – around 30 people per year since 1930. It should be noted that there are some discrepancies in available data; for instance, the EAD data represents a population in 2020 of 6,292 whereas the U.S. Census represents a population of 6,386 for the same year. Based on this, HDR has elected to use the EAD data for population forecasting. Figure 3 is the historic population of the City of Douglas based on U.S. Census data.

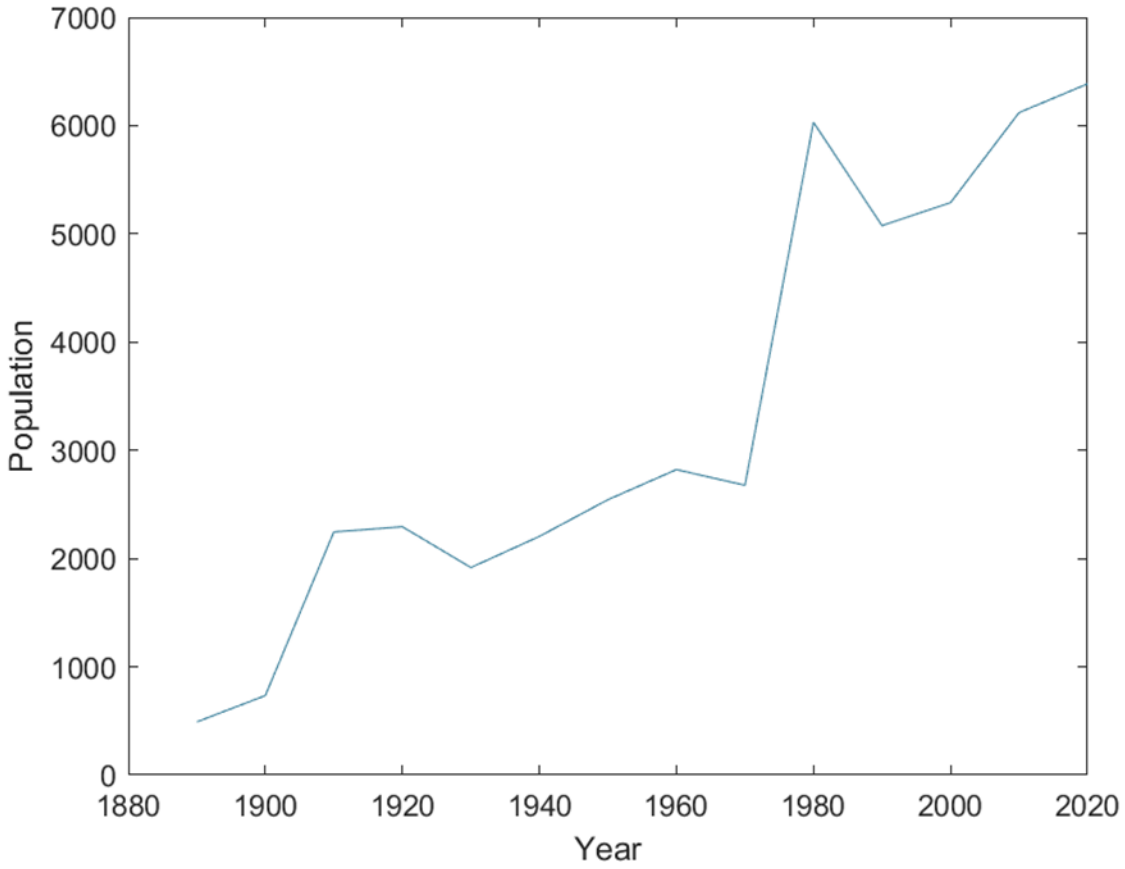


Figure 3. Historic Douglas Population Growth (United States Census Bureau, 2024)

The Wyoming A&I-EAD developed a population projection to the year 2040 that estimates steady growth for the City of Douglas (Wyoming Office of Administration & Information - Economic Analysis Division, 2025). The growth is at a slow rate, between 0.30% and 0.40%. It is unclear how this growth profile was produced; however, the same growth profile is applied to all municipalities in Converse County.

According to the Converse County Clerk, the county's population is projected to reach approximately 20,000 people by 2043 (C. Chaffin, personal communication, July 27, 2024). This projection was used as baseline to determine a higher bound of growth in the City of Douglas, as it is the largest municipality in Converse County. Notably, the A&I EAD estimate for Douglas in 2020 is 94 people lower than the figure reported by the U.S. Census data. As the 2020 U.S. Census can be unreliable, the A&I EAD estimate was taken as a baseline for future calculations. Based on the estimates from A&I-EAD, the expected year-over-year population growth in Douglas could be beneficial to future capital improvements projects. This can be best rationalized by population growth driving additional revenue for the City in both taxes and user fees

for the water system. Figure 4 illustrates the population estimates and projections provided by A&I EAD.

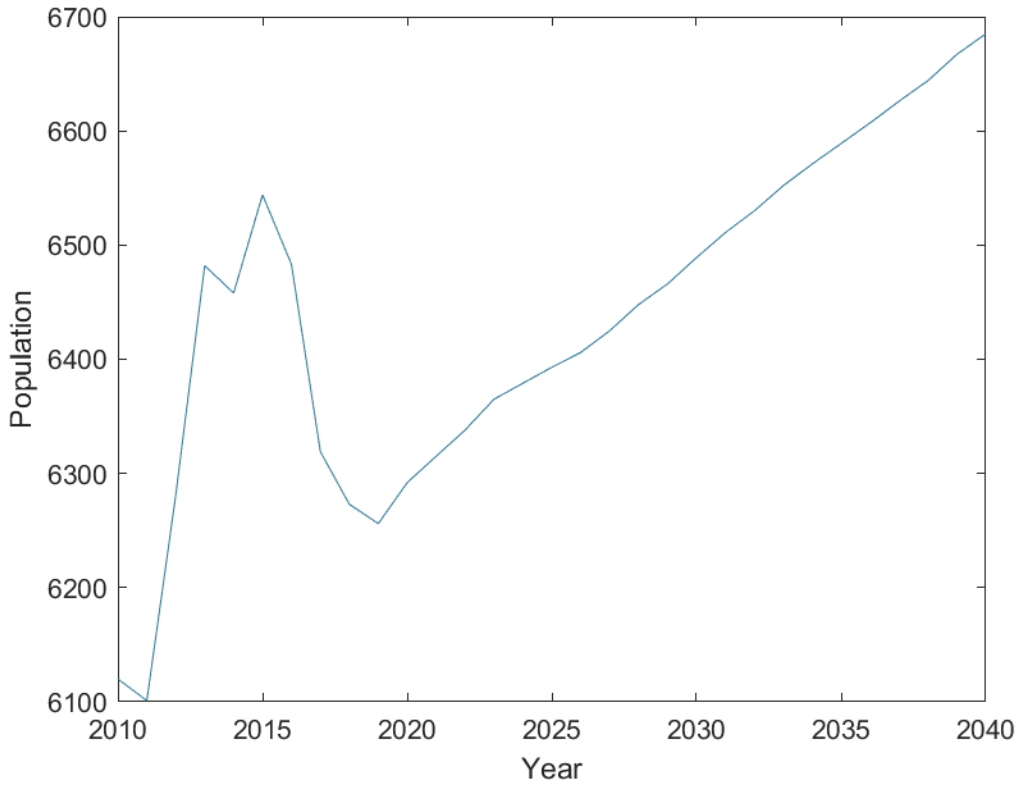


Figure 4. Douglas A&I EAD Population Projection

2.2 Growth Projection of Population and Service Area

To provide the Sponsor with relatively conservative growth estimate(s), growth profiles were selected for the next fifty years to describe potential scenarios in which the City of Douglas may experience. These scenarios were used rather than using a variable and changing growth estimate from the State of Wyoming A&I-EAD and estimates from the County Clerks' office due to large uncertainty in those models.

As mentioned previously, Douglas has historically experienced a consistent population increase of approximately 30 people per year since 1930, save for a very high growth period through the 1970s. As is common in Wyoming towns, these high population growth periods typically mirror increased activities in the mineral extraction industry and are exceptionally difficult to predict. Recent developments by the Bureau of Land Management and the current Federal Administration have given some legitimacy to the possibility of up to 5,000 oil and gas wells to be developed in Converse County at large (United States Bureau of Land Management, 2025). Given the current state of these industries in Converse County, the City of

Douglas may experience this type of growth soon. While economic booms do occur, it should be recognized that this is not a guarantee of future population growth.

To estimate Douglas' future growth, the selected capital infrastructure planning method applied a range of reasonably low and high annual growth rates to bracket projected future population growth. Based on historical growth and data from the Wyoming A&I EAD, an annual growth rate of 0.4 percent per year is a reasonably low projection estimate. An annual maximum growth rate of 1.3 percent, the average growth of the State of Wyoming over the last 66 years—was chosen as the average maximum growth rate for Douglas.

In addition to these growth rates, a third growth rate was applied to reflect the potential impact of increased mineral production activities. This growth rate assumes a 5 percent annual growth rate sustained over a 10-year period, after which it returns to the maximum annual growth rate of 1.3 percent, assuming supporting growth within the community following the boom.

Each of these three scenarios is shown in Table 4. Along with the table, Figure 5 shows the estimates in a graphical format.

Table 4. Douglas Service Area Past Estimates and Growth Projection

Year	Population with Growth Rates Scenarios		
	Rate 1: 0.4%	Rate 2: 1.3%	Rate 3: 5.0% Then 1.3%
2020	6,382	6,382	6,382
2023	6,449	6,449	6,449
2028	6,579	6,879	8,231
2033	6,712	7,338	10,505
2038	6,847	7,828	11,615
2043	6,985	8,350	12,390
2048	7,126	8,907	13,216
2053	7,269	9,501	14,098
2058	7,416	10,135	15,038
2063	7,566	10,811	16,042
2068	7,718	11,532	17,112
2073	7,874	12,302	18,253

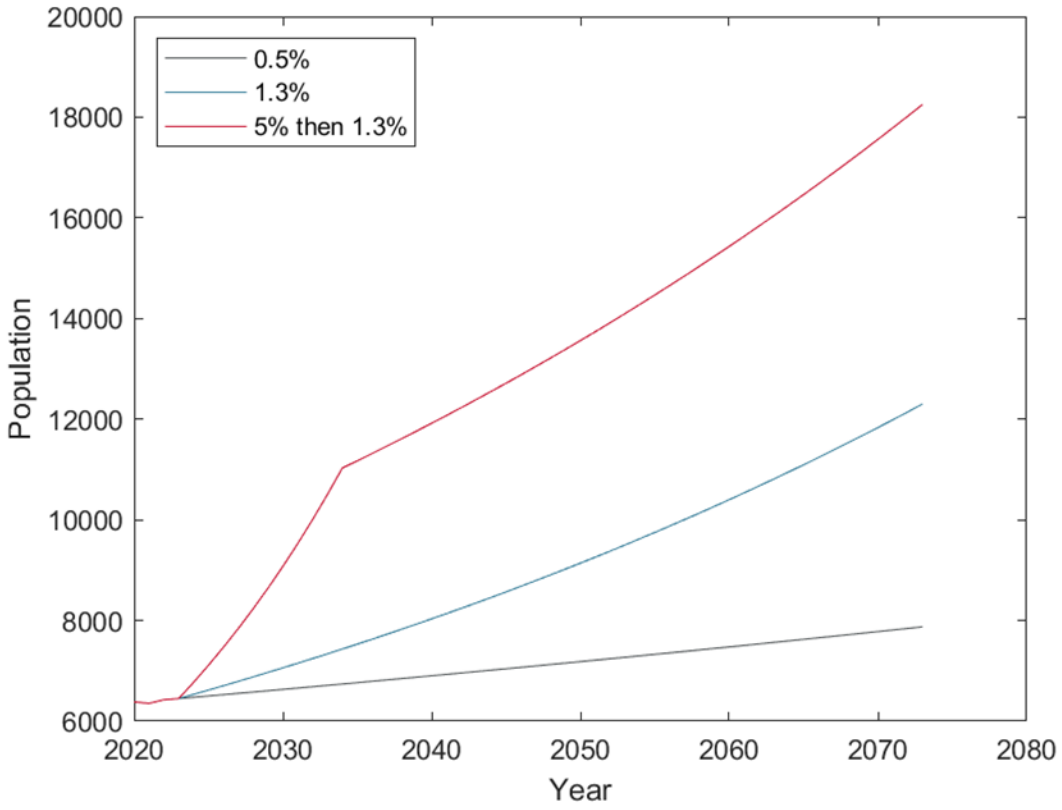


Figure 5. Projected Growth Rates for Service Area Population

Figure 5 illustrates the low (0.4%), high (1.3%) and "boom" (5%) growth scenarios from 2020 through 2073 for the City of Douglas.

To estimate the effect of population growth on Douglas as a whole, these projections can be compared to the current service area as well as to the future land use projections previously mentioned in section 2.2. The County Clerk has provided an estimate of the entire county for the next 20 years. Based on this estimate, it is assumed that the City of Douglas will be 46% of the county-wide population. In this projection, it is estimated that the population of Douglas will reach 9,200 by the year 2043.

It should be stated that this estimate does not account for the varying growth rates of all municipalities within the county. This estimate is slightly above that of the 1.3% estimate provided above.

Additionally, the 2014 Master Plan for the City of Douglas allowed for growth in the service area of Douglas, as well as an increase in population. The plan accommodates a growth of near 15,000 residents in the City by the year 2054. Compared to the projections referenced earlier, this projection aligns with the "boom" growth scenario.

As numbers from both the master plan and the County Clerk have been used to guide the planning of future projects of the county, it can be concluded that the growth projections presented fall within the bounds of the projected growth of the City of Douglas.

2.3 Water Supply Projections

When evaluating population growth, HDR also considered the overall effect of the population growth on the current water supply. Given water consumption information over the past 15 years, it was determined that the peak day demand per person in Douglas was 783 gallons. This amount was used in June 2015 and represents the highest overall consumption for any given peak day demand.

Using this number, an estimate of peak day water usage was developed by multiplying the consumption per person by the estimated population each year, as shown in Figure 6. The City's total water appropriations were plotted on the graph to represent the total available water supply currently available, calculated based on the active water rights for the City of Douglas, found Sections 4.2, 4.3, and 4.4. Total appropriations can be adjusted in times of prolonged drought, in the event that administration should occur.

In addition to the plotted appropriation maximum, two more lines were added to this plot. The first was the 2023 maximum production capacity, which was found by adding together all sources at their maximum in 2023. The other line represents the reliable production capacity that was given to HDR by the City of Douglas water supervisor. These lines represent 3.5 MGD and 3.0 MGD respectively. As seen on the figure below, these productions are significantly reduced from the appropriated maximum allotted by the SEO. This is due to a multitude of reasons such as groundwater recharge limitations, carrying capacity of pipelines, and limited production from the WTP.

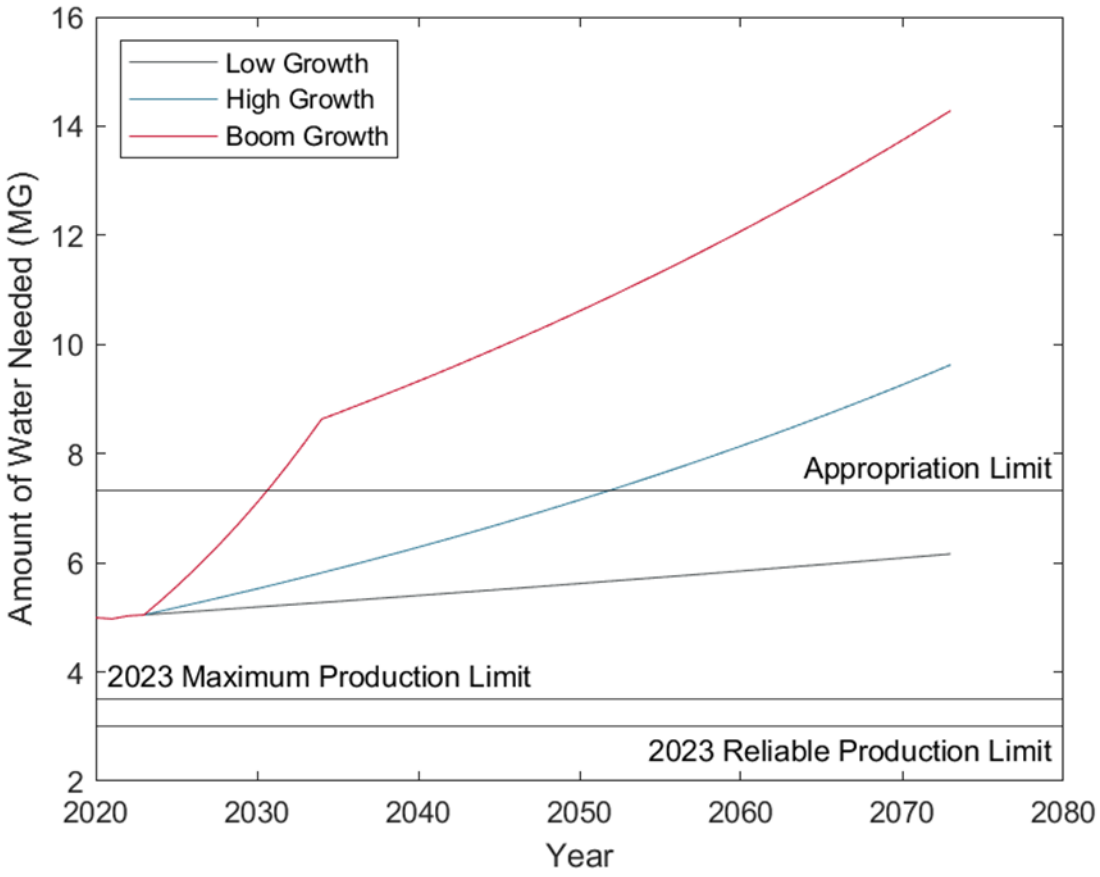


Figure 6. Peak Day Consumption Rates with Population Increase

Figure 6 shows an immediate need for additional water supply as both the maximum and reliable production limits are below the consumption limit. On days of peak day consumption, this figure shows that the City of Douglas cannot reliably produce enough water to match the consumption rate. There is a deficit of around 1.5 MG of water that could be seen if the consumption rate were ever that high again. To supplement Figure 6 above, Table 5 was developed to show potential water usage for each of the three scenarios for peak day demand.

Table 5. Peak Day Water Consumption for Growth Scenarios

Year	MG of Water Needed (Peak Day)					
	Low Growth		High Growth		Boom Growth	
	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit
2020	4.99	-1.99	4.99	-1.99	4.99	-1.99

Year	MG of Water Needed (Peak Day)					
	Low Growth		High Growth		Boom Growth	
	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit
2025	5.09	-2.09	5.18	-2.18	5.56	-2.56
2030	5.19	-2.19	5.52	-2.52	7.1	-4.1
2035	5.29	-2.29	5.89	-2.89	8.74	-5.74
2040	5.4	-2.4	6.29	-3.29	9.33	-6.33
2045	5.51	-2.51	6.7	-3.7	9.95	-6.95
2050	5.62	-2.62	7.15	-4.15	10.61	-7.61
2055	5.73	-2.73	7.63	-4.63	11.32	-8.32
2060	5.85	-2.85	8.14	-5.14	12.08	-9.08
2065	5.97	-2.97	8.68	-5.68	12.88	-9.88
2070	6.09	-3.09	9.26	-6.26	13.74	-10.74
2073	6.16	-3.16	9.63	-6.63	14.28	-11.28

It should be noted that this figure represents a more extreme case of water consumption and does not account for any future administrative controls that could be implemented. The plot shows distinctly that, depending on the growth rate, Douglas' peak day demand will meet the total available municipal supply at varying points in time depending on probable growth rate.

For the "boom" estimate, the peak day demand meets the total available supply in the year 2031. For the high estimate, the City will reach its total water appropriation limit in 2052. Either case calls for more water to be appropriated for the City. For the low estimate, it is unlikely that the City will exceed current total water appropriations within the planning horizon for this plan. The recommendation for this study regarding the acquisition of additional water rights is discussed in section 6.1 about additional water sources.

In addition, Figure 7 was created to show the average consumption rate of the City of Douglas, which is approximately 241 GPCD. Each of the consumption lines was replotted to show an average day of consumption in the City.

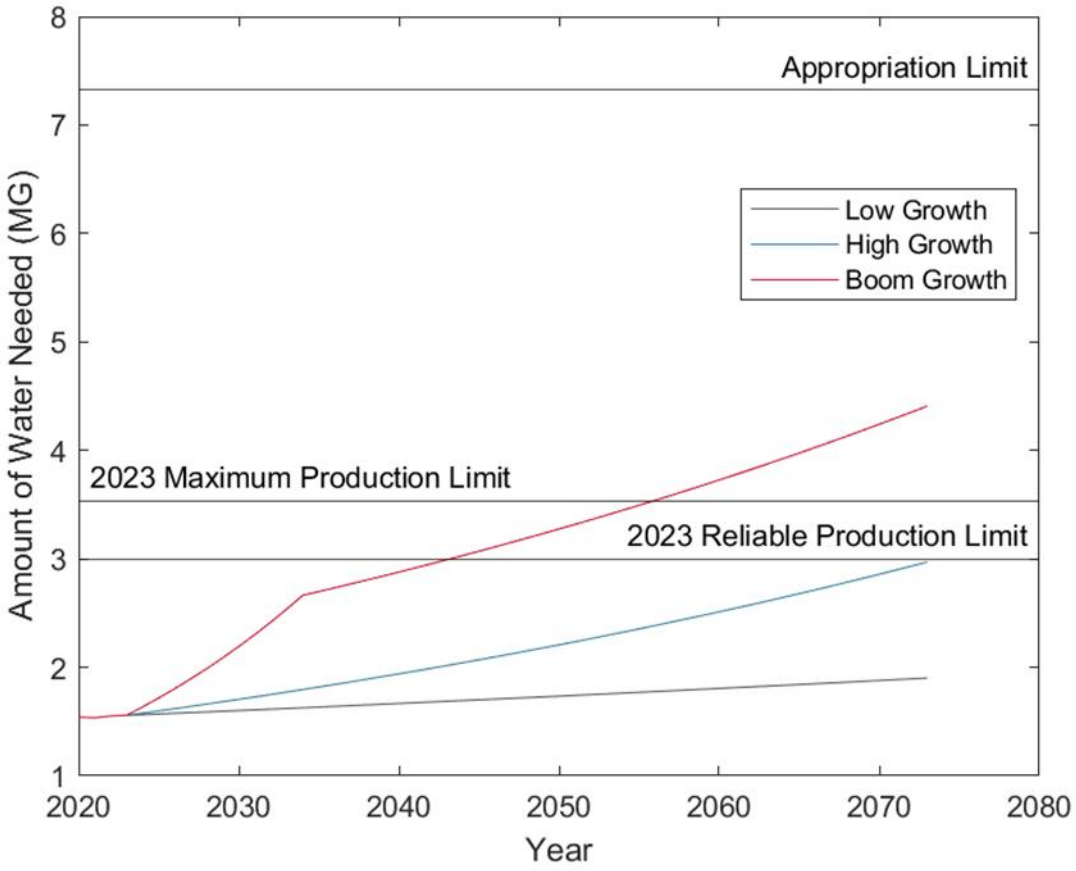


Figure 7. Average Day Consumption Rates with Population Increase

This figure shows that the needs of the City can be reliably met by the current water sources on any average day of the year. Although this figure shows a better outlook for the City in terms of water usage, it should still be noted that maximum consumption days are still likely to occur in the summer months, which the current infrastructure cannot handle. These are further reflected in Table 6, similar to Table 5 above.

Table 6. Average Day Water Consumption for Growth Scenarios

Year	MG of Water Needed (Average Day)					
	Low Growth		High Growth		Boom Growth	
	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit
2020	1.54	1.46	1.54	1.46	1.54	1.46
2025	1.57	1.43	1.6	1.4	1.72	1.28
2030	1.6	1.4	1.7	1.3	2.19	0.81

Year	MG of Water Needed (Average Day)					
	Low Growth		High Growth		Boom Growth	
	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit	Water Needed	Surplus/ Deficit
2035	1.63	1.37	1.82	1.18	2.7	0.3
2040	1.67	1.33	1.94	1.06	2.88	0.12
2045	1.7	1.3	2.07	0.93	3.07	-0.07
2050	1.73	1.27	2.21	0.79	3.28	-0.28
2055	1.77	1.23	2.35	0.65	3.49	-0.49
2060	1.81	1.19	2.51	0.49	3.73	-0.73
2065	1.84	1.16	2.68	0.32	3.98	-0.98
2070	1.88	1.12	2.86	0.14	4.24	-1.24
2073	1.9	1.1	2.97	0.03	4.41	-1.41

As part of the planning and growth evaluation process, it is prudent for the City to consider the development and acquisition of additional water resources to augment available supply for municipal uses, as addressed in the potential alternative above. To provide the City with more accurate rates for planning purposes, a forecasted projection of the demands is shown below in Table 7. These demands were assessed by using the most current data, not using a 10-year historical view as addressed above.

Since water use varies by time of year, both summer and winter demands were considered for this analysis. It should be noted that that these numbers for winter and summer represent usage during the irrigation season (summer) and non-irrigation season (winter). As expected, summer demands are significantly larger than winter demands.

Table 7. Projected Demands in GPCD

Demand Type/Season	GPCD
Average Day Demand (Winter)	135.16
Max Day Demand (Winter)	271.34
Average Day Demand (Summer)	289.97
Max Day Demand (Summer)	446.24

To supplement the projected demands on the City of Douglas' water system, the City should use available information to address upcoming developments within the Douglas area, specifically the Lambert Subdivision and Seven Trails addition. The municipal code includes a table that states that water meter sizes give specific capacity values. Equivalent dwelling units (EDUs) are defined as a measurement of demand on water facilities equivalent to a single-family home (*Equivalent Dwelling Unit (EDU) Definition | Law Insider*, n.d.). EDUs can be used to estimate water usage for proposed developments. Table 8 below provides the sizes, rates, and maximum flows for the tap sizes in the table.

With administrative controls such as the tiered rate system currently in place, Table 8 provides an outlook for the water usage depending on the season. These demands are based on system-wide data from the City's water operations. It should be noted that the peak demand for the system dropped significantly by 43% from its high in 2015. These projected demands can be used to plan for growth within Douglas in the future as new developments are considered. However, it is recommended that project-specific studies be evaluated to consider the probable demands indicated by specific development type.

Table 8. Equivalent Dwelling Units in Service Area Table

Water Meter Size	EDU Equivalent	Flow capacity (GPM)
¾ inch	1	30
1 inch	1	50
1 ½ inch	2	100
2 inch	3.2	160
3 inch	6	350
4 inch	11	630
6 inch	36	1400
12 inch	144	5000
Adapted from (AWWA, 2024; City of Douglas, 2025)		

Depending on the size of development, this table can be used to estimate the number of EDUs placed on the system based on meter size. For example, if high-density residential housing is planned in one of the potential expansion areas, the City can use Table 8 to determine the amount of EDUs needed to service that development. This type of analysis can inform efforts to understand increased demand on the system. Additionally, an inventory of tap sizing through the City can

also inform the current EDUs in the system, providing insight into typical water demands.

Based on the evaluation performed on the available data, HDR believes that the 1.3% growth rate is most appropriate for the uses of this report and planning. This growth rate presents a balanced rate that agrees with data and overall capacity for the City of Douglas.

Due to the uncertainty of mineral industries within the state, the “boom” growth rate is not as accurate as the lower two growth rates. In addition to this, the low growth rate does not thoroughly take into account the planned expansions and developments currently in place. Due to these factors, the 1.3% growth rate per year is most appropriate when discussing the population of the City of Douglas. This estimate highlights the likely need of water acquisition for Douglas. While there is not an immediate need for additional water sources, the projected population growth does present a clear basis for identifying and pursuing additional water sources to augment the City’s supply soon.

3.0 North Platte Drainage

The North Platte drainage is one of the most significant drainage systems in Wyoming. It is composed of a significant hydrological area, influencing water flow and supplying a large portion of central and east-central Wyoming. The North Platte has driven significant changes in the region, defining many different geographical as well as ecological areas. The ecological impacts of this drainage are significant drivers for recreation and conservation both in Wyoming and Nebraska.

The headwaters of the North Platte are located in northwest Colorado, south of Walden, at the confluence of Grizzly and Little Grizzly creeks. Runoff from this drainage from both snowmelt and rainwater helps develop flows into several storage and regulation reservoirs as water flows through Wyoming. Additional contributing drainages include the Medicine Bow River, Sweetwater River, and the Laramie River. The primary flow of the North Platte runs through southern Wyoming, heading north toward Rawlins, Wyoming before entering Seminoe Reservoir. From Seminoe, the river flows into the Pathfinder Reservoir and shortly after that, Alcova. This series of dams serves a critical role in providing and regulating water flow through the rest of the North Platte basin as well as offering recreational opportunities.

The North Platte drainage flows through a varied terrain. The headwaters originate in mostly high elevation mountains and plains. A portion of the total headwater then flows through a varied plateau region as they advance from Walden toward Rawlins. From Rawlins to the Seminoe-Kortes-Pathfinder-Alcova complex, the river runs

through a series of high topographic relief features derived from pre-historic glacial action and river erosion. After the dam complex, the river flows through Casper, Glenrock, and on to Douglas and sees a relatively uniform terrain of rolling hills with some features of the Badlands. Many of the smaller drainages along this reach of river are heavily influenced by storms in the summer, often leading to flashy, sediment-rich drainage. These drainages have a significant influence on the river water quality as flows advance to the east.

The watershed spans an area of approximately 31,000 square miles running for a total drainage length of 716 miles, terminating in Lisco, Nebraska. The drainage collects annual runoff from snowmelt and rain across numerous sub-drainages. Across the watershed area, most of the native land is semi-arid and is therefore extremely dependent on precipitation for a water source.

Recent drought cycles have significantly impacted the available water within the North Platte drainage system, increasing the likelihood of water calls on the river and its dams. The climate in the area is mostly dry, with the area around Casper and Douglas, Wyoming receiving 10-14 inches of precipitation annually.

Average snowfall for the area varies from region to region, with the Casper area and nearby Laramie Mountains receiving approximately 10.2 inches of snow water equivalent in most years. For context, snow water equivalent is the amount of water available in snow (United States Department of Agriculture, 2025b). This metric is temperature-dependent; at near-freezing temperatures (33-30 degrees Fahrenheit), one inch of rain is equivalent to two inches of sleet, whereas in the extreme cold, one inch of rain is equivalent to up to 50 inches of sleet. The snow water equivalent for Casper accounts for almost half of the water derived from the surrounding drainages in very approximate terms.

Like Casper, Douglas experiences a semi-arid climate with hot, dry summers followed by cold and potentially snowy winters. Temperatures in the summer range from 70-90+ degrees Fahrenheit. Precipitation is mostly limited to afternoon thunderstorms which deliver flashy flows of runoff. The flow in the North Platte near Douglas fluctuates seasonally with some control from reservoirs upstream. Springtime flow is influenced as snowmelt raises water levels in the river. Summer and fall flows in the North Platte are lower due to evaporation and reduced runoff from surrounding drainages. Base flow in this reach is governed by discharges from the Seminoe-Alcova complex.

Drainages local to the Douglas area can be best captured by four primary perennial drainages downstream of Casper. These include the following that drain from the south:

- Muddy Creek

- Deer Creek
- Box Elder Creek
- LaPrele Creek

Drainages from the north, downstream of Casper, are primarily ephemeral or light perennial drainages that only see flows due to either snowmelt or large precipitation events. Each of these drainages deliver water to the North Platte that is used by irrigators and municipalities alike.

The use for agricultural needs along the North Platte are many and are primarily to support livestock and crop production. Crop growth accounts for the largest share of water use from the North Platte drainage. Figure 8 illustrates the reach of the drainage within the region bounded by Casper and Douglas toward Glendo Reservoir.

The North Platte and all sub-watersheds provide critical irrigation water for a variety of crops, including alfalfa, corn, wheat, and hay crops. Agriculture is an important industry in the region, driving growth and building upon over one hundred years of historic water use. Recent developments in the area — primarily the destruction of the LaPrele dam due to structural failure mitigation — will have significant impacts on the drainage and members of the public served by this water source.

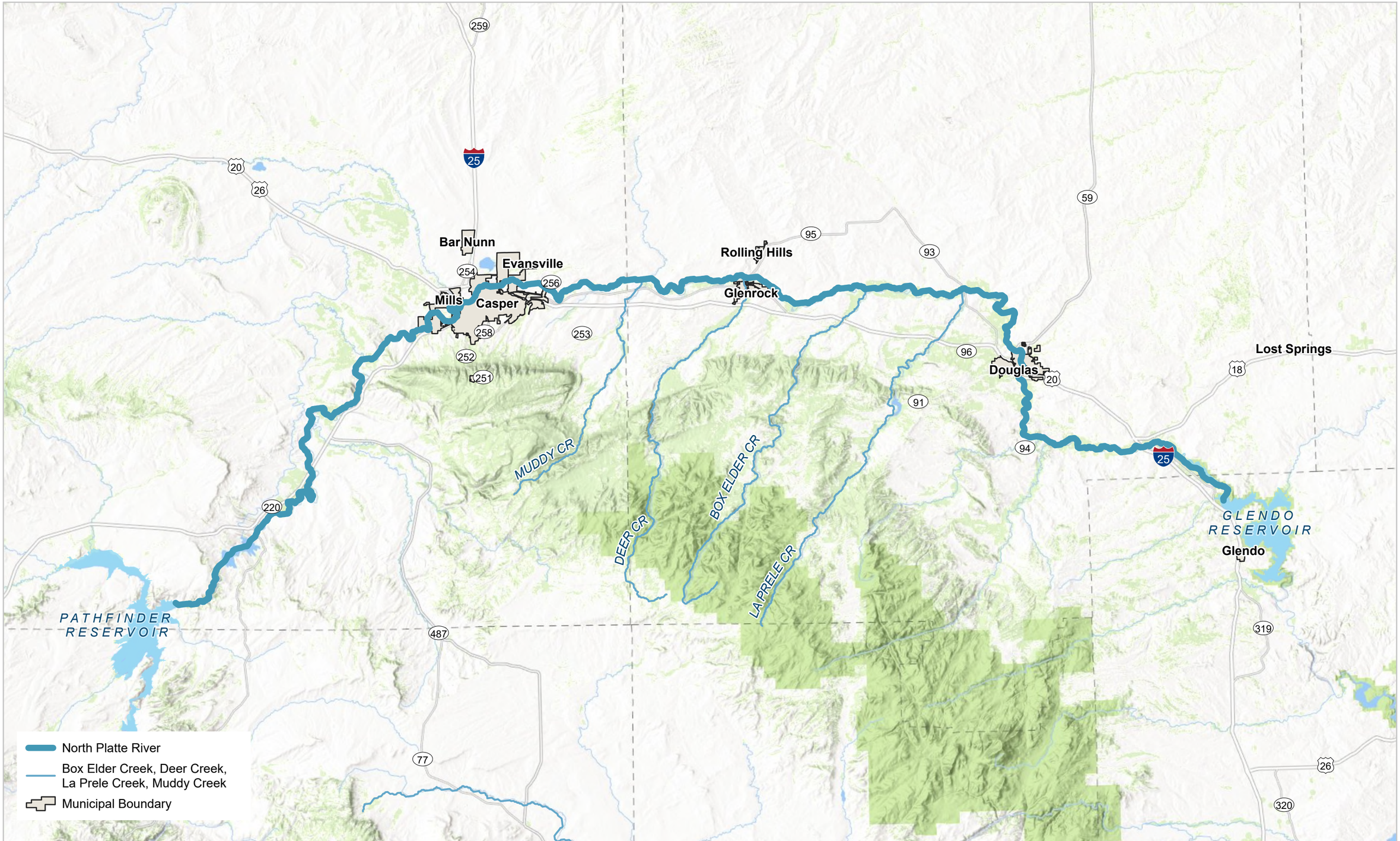


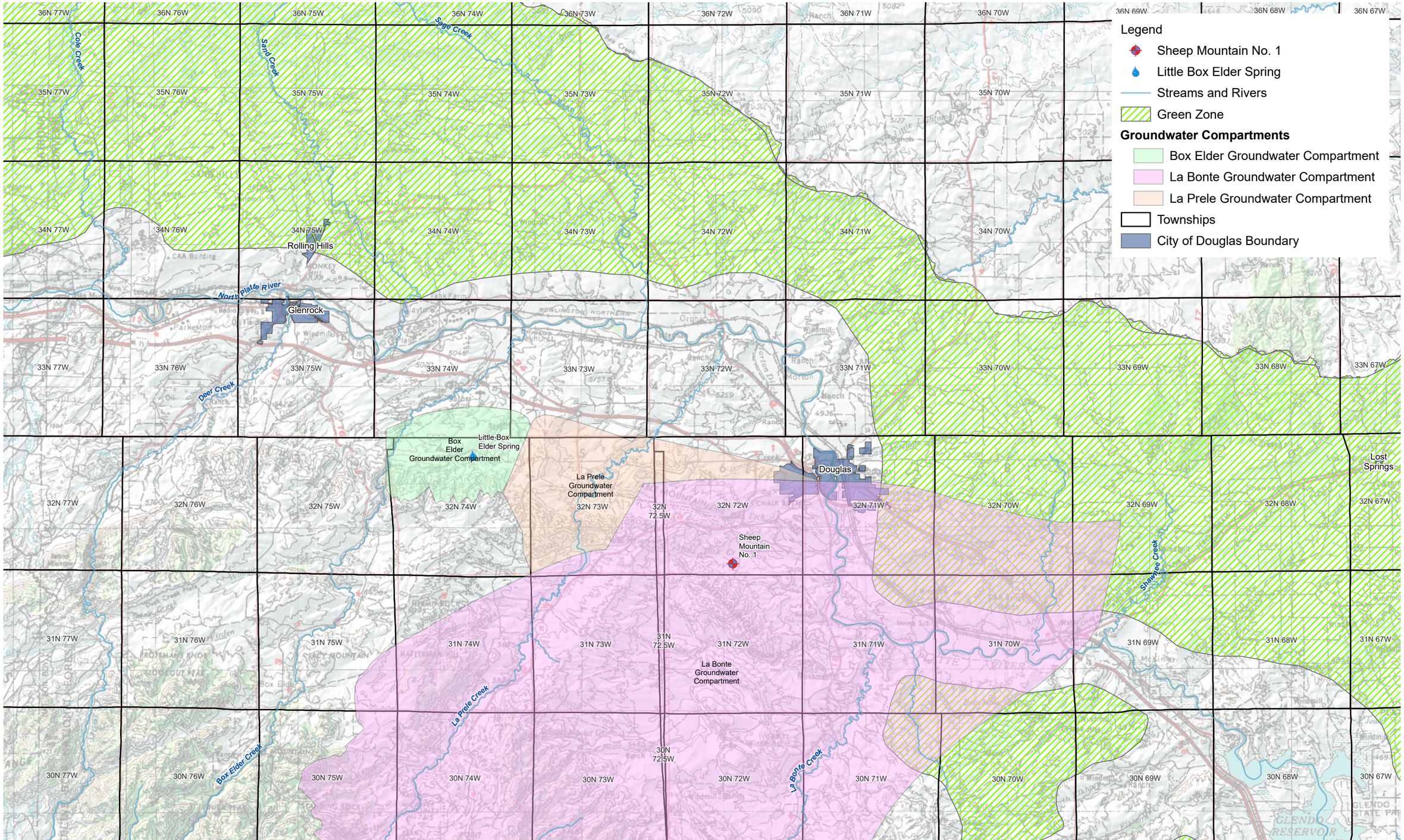
Figure 8. North Platte Basin (Pathfinder to Glendo)

The ecology of the NPR system is diverse and vital from recreational and conservational standpoints. Many areas, especially those downstream of the Seminoe-Alcova dam complex, have been rated as blue-ribbon fisheries, with trophy fish species including rainbow, brown, and cutthroat trout (United States Department of the Interior, 2025). Additionally, recreational opportunities include floating, waterfowl hunting, and observing wildlife. The riparian areas along almost all the North Platte serve as a habitat for many of these species, comprised of cottonwoods, willows, and other near water species of vegetation. The river system also serves as a water source for many large game and stock animals.

The overall water quality for the NPR system is generally considered to be good. However, inflows from agricultural and industrial runoff lead to water quality issues during large runoff events. Secondary issues arise from natural drainages conveying silt and sediment into the river, making use and treatment difficult at times. The river system is a critical asset to the region, serving municipalities, industries, and recreational activities alike. The area surrounding Douglas is dependent on the river and the water that it carries to support wildlife, livestock, crops, industry, and public drinking water. The river system forms a complex relationship with both users up and downstream as well as users across state lines.

4.0 Existing Water Sources

Figure 9 shows the existing water sources that supply the City of Douglas.



LOCATION OF SHEEP MOUNTAIN WELL NO.1 AND LITTLE BOX SPRING

DOUGLAS, WY

\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039964207.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 5/20/2025

Figure 9. Location of Douglas Water Sources

4.1 Summary of Current Regulatory Standards

All the water sources for the City of Douglas are subject to regulation under various standards and rules set forward by the EPA. As each water source is classified as a municipal use source, they are all subject to EPA regulation. The EPA has primacy over the regulations for the State of Wyoming, so the Wyoming Department of Environmental Quality has no state regulations in conjunction with the federal standards. Below are each of the standards that the City of Douglas is subject to.

4.1.1 National Primary Drinking Water Regulations

First, the National Primary Drinking Water Regulations (NPDWR) are the main standards all water sources are subject to. This set of regulations have sections that set MCL for various categories of contaminants that can be found in drinking water (EPA, 2025d). These categories include microorganisms, disinfection byproducts, disinfectants, inorganic chemicals, organic chemicals, selected PFAS chemicals, and radionuclides. These categories are shown in each of the overall water quality tables seen in Sections 4.2, 4.3, and 4.4.

4.1.2 National Secondary Drinking Water Standards

The National Secondary Drinking Water Standards (NSDWS) are another set of guidelines that the EPA recommends communities follow. As they are guidelines, they are not federally enforceable but are there to assist communities in maintaining a higher quality of water. It should also be noted that there are no health concerns with respect to these standards as they are meant to treat cosmetic, aesthetic, and technical effects of water (EPA, 2025g). Of special note is a requirement to notify communities of high fluoride levels if they exceed the secondary MCL. A full table of the NSDWS, broken down by source, can be found in Appendix C- Water Quality Regulations and Secondary Standards Data.

4.1.3 Safe Drinking Water Act

Another program that can affect Douglas' drinking water sources is the Safe Drinking Water Act (SDWA). This act states the right to set more stringent standards than those of the Primary and Secondary Drinking Water Standards (EPA, 2025e). At current, the EPA has primacy over the State of Wyoming. This is not to say that the State of Wyoming cannot develop a program to obtain primacy in the future.

In accordance with the SDWA, the EPA also has a responsibility to implement the Unregulated Contaminant Monitoring Rule 5 (UCMR5) (EPA, 2025a). This rule sets guidelines for contaminants not yet regulated to determine future regulatory standards under the SDWA. The City of Douglas, considered a small system by this rule, is subject to the testing conducted under UCMR5. A UCMR5 test for the City occurred in 2024. A full list of all UCMR5 compounds can be found in Appendix C- Water Quality Regulations and Secondary Standards Data.

4.1.4 Lead and Copper Rule

The Lead and Copper Rule (LCR) was set in 1991 to monitor and control the levels of lead and copper within the drinking water supply. At current, the levels set for action are 15 ppb and 1.3 ppm, respectively. Actions can include corrosion control treatment, service line replacement, and water quality parameter monitoring. Failure to take appropriate action if these levels are exceeded will result in a violation. In 2021, this rule was revised to address the potential presence of lead service lines in communities. Key aspects of the revision included initial inventories of service lines and notifications to residents who may be affected (EPA, 2025c). In 2024, improvements to the rule were made to enact rigorous water testing and lowering levels before triggers on water quality are flagged (EPA, 2025f). These improvements were made to better inform communities about lead exposure in water.

4.1.5 Ground Water Rule

The Ground Water Rule (GWR) is another rule set that affects the City of Douglas. According to the EPA, the GWR aims to reduce the risk of microbial infections in drinking water coming from a groundwater source. The GWR monitors fecal indicators in groundwater sources such as E. coli, enterococci, and coliphage (EPA, 2025b). As both the LBES and Sheep Mountain Well are considered groundwater sources, they fall under the regulation of the GWR.

4.1.6 Surface Water Treatment Rule

The surface water treatment rule (SWTR) was enacted to reduce pathogen concentrations in treated surface water sources, targeting microorganisms such as Cryptosporidium, Legionella, and Giardia lamblia. The SWTR has been amended and updated many times to further reduce the pathogens in the water. The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is the newest of the surface water treatment regulations (EPA, 2025h). For this rule set, the City of Douglas is classified as a Schedule 4 system, Bin 1, serving less than 10,000 people. This rule specifically targets Cryptosporidium levels in the water.

4.2 Little Box Elder Spring

4.2.1 Source Background Information and History

The LBES is the main water source for the City of Douglas. This spring has been providing water for the City since the early 1920's, after the water rights were transferred to the City. In 2014, the spring house was remodeled for improvements that were recommended in previous master plans. Excess water produced from the spring flows back into Box Elder Creek via a notched weir. The location of Box Elder Creek can be seen in Figure 9. The locations of the LBES and transmission line to the City of Douglas are shown in Figure 24. LBES is in the Box Elder Groundwater Compartment, as defined by Garland (Garland, 1996). The LBES is believed to intercept fractures in the Casper Formation, Madison Limestone, Englewood Formation (non-water bearing) and Fremont Canyon Sandstone. When the Little Box Elder No. 1 well was drilled, the top of the Casper Formation was encountered at 14 feet and Precambrian amphibolite rocks were encountered at the bottom of the well at 1,170 feet. Additional information, including aquifer testing results, is provided in the Water Supply Alternatives section of this report. Figure 10 below is a photo of the spring house that is currently in use.



Figure 10. Site Photo of Spring House

4.2.2 Water Rights

The water rights belonging to the LBES were reviewed using the Wyoming SEO's e-Permit System. Table 9 shows the total water rights held by the City of Douglas for diversions at the spring. The permits and certificates of appropriation for these rights can be found in Appendix A – Water Rights.

Table 9. LBES Water Rights

Use	Permit Number	Designation	Name	Appropriation	Priority Date	Comments
Municipal	3334 (Territorial)	-	Carey Little Box Elder No.1 Ditch ACT Douglas Pipeline	1.6 cfs	5/20/1885	Order 06/354-355 describes change of use from irrigation to municipal use
	3338 (Territorial)	-	Little Box Elder Ditch No.4 ACT Douglas Pipeline	0.87 cfs	Spring 1885	
	3331 (Territorial)	-	E.S No. 1 Ditch ACT Douglas Pipeline	1.1 cfs	1879	
	3332 (Territorial)	-	E.S No. 2 Ditch ACT Douglas Pipeline	0.36 cfs	1879	
	2335	E	Enlargement of Little Box Elder Ditch Co. No. 4 Ditch ACT Douglas Pipeline	0.2 cfs	4/20/1910	
	16937	D	Douglas Pipeline No. 1	3.8 cfs	8/20/1923	CR CC45/283 describes a limit of 3.8 cfs from the appropriations listed above
	7179	E	First Enlargement of Douglas Pipeline No. 1	0 cfs	1/17/1996	Enlargement of service area for Douglas Pipeline No. 1
Water Haul	36880	D	Little Box Elder Water Haul	1.11 cfs	4/13/2023	Time limited, expires 5/2/2025
Compiled from Wyoming SEO Records (State of Wyoming Engineer's Office, 2025b)						

The City of Douglas holds four territorial permits, all of which have been transferred to the Douglas Pipeline. Together, these rights total 3.93 cfs. Additionally, the City holds a right 0.2 cfs, also transferred to the Douglas Pipeline, with a priority date of April 20, 1910.

Order OR 06/354 documents the change of use for these permits from irrigation to municipal use with no loss of appropriation. Permit no. 16397.0D authorizes the construction of the Douglas Pipeline No. 1 facility and limits the total supply of water rights from the spring to 3.8 cfs based on the irrigation appropriations. The construction of Douglas Pipeline No.1 changed preferred water uses under E.S. Nos. 1&2, Carey Little Box Elder Ditches from Little Box Elder Creek, Little Box Elder No. 4, Enl. Little Box Elder No. 4 Ditches diverting from Box Elder Spring based on Board of Control Order approved April 12, 1924. The reduction of water supply can be seen in Certificate of Record CC45/283.

Permit 7179.0E is an enlargement permit for the Douglas Pipeline. This enlargement did not include any additional appropriation; rather, it expanded the service area with a priority date of January 17, 1996.

Permit No. 36880.0D is a water haul permit that authorizes the industrial use of water from LBES for oil and gas construction. This permit allows the water to be used for drilling, stimulation, and incidental well site construction. The permit is a Temporary Use Permit and expired on May 5, 2025.

4.2.3 Water Quality

Water quality analysis was conducted from records received by the City. These records were from the United States Environmental Protection Agency (EPA) testing regulations discussed in the Summary of Current Regulatory Standards section of this report. For LBES, the regulations are tabulated below, with each contaminant accounted for by a minimum, maximum, and average value over the testing period of 2013 to 2024. Maximum Contaminant Levels (MCL) can also be seen in Table 10.

Table 10. LBES Water Quality Data

Parameter	4002 Gross Alpha	Gross Beta	4000 Gross Alpha - Adjusted	4006 Uranium	4010 Radium 226 + Radium 228
Unit	pCi/L	pCi/L	pCi/L	mg/L	ug/L
Maximum Contaminant Level	15	4mrem/yr	15	0.03	5
Min	5.3	11.9	0.94	0.0079	0.8
Max	10.5	11.9	1.1	0.0092	2.5
Average	7.62	---	1.02	0.00855	1.25
Parameter	1005 Arsenic	1010 Barium	1075 Beryllium	Copper	1025 Fluoride
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	0.01	2	0.004	1.3	4
Min	0.005	0.1	---	0.01	0.3
Max	0.006	0.1	---	0.01	0.4
Average	0.00525	---	---	---	0.32
Parameter	Nitrogen, Nitrate + Nitrite as N	1045 Selenium	Sulfate	1085 Thallium	2216 Chloroethane
Unit	mg/L	mg/L	mg/L	mg/L	ug/L
Maximum Contaminant Level	10	0.05	250	0.002	200
Min	0.8	0.001	37	---	2
Max	0.8	0.003	41	---	2
Average	0.8	0.002	39	---	2

Parameter	2943 Bromodichloromethane	2942 Bromoform	2944 Chlorodibromomethane	2941 Chloroform	2210 Chloromethane
Unit	ug/L	ug/L	ug/L	ug/L	ug/L
Maximum Contaminant Level	80 (combined)			80	N/A
Min	1.1	1.1	0.8	---	0.34
Max	1.1	1.3	0.8	---	0.34
Average	1.1	1.2	0.8	---	0.34

Parameter	Nitrates	1022 Copper	--- Indicates a Non-Detection Reading
Unit	mg/L	mg/L	
Maximum Contaminant Level	10	1.3	
Min	0.8	---	
Max	1.01	---	
Average	0.90769	---	

4.3 Sheep Mountain Well No. 1

4.3.1 Source Background Information and History

The Sheep Mountain Well No. 1 (SMW), located approximately six miles southwest of Douglas, was drilled to supplement the City's water supply in the summer months. The well was permitted on April 17, 1990, drilled from May through July 1990 by D.C. Drilling Company from Lusk, Wyoming, and placed online for the City of Douglas in 1994. The as-built for the SMW can be found in Appendix B – Operating and Design Criteria. The water production history for Sheep Mountain Well No. 1 is provided in Table 11.

Table 11. Sheep Mountain Well No. 1 Annual Water Production History

Year	Million Gallons Pumped	Acre-Feet Pumped
1994	82.27	252.48
1995	69.44	213.1
1996	102.37	314.16
1997	NR	NR
1998	NR	NR
1999	NR	NR
2000	107.81	330.86
2001	98.53	302.36
2002	126.97	389.65
2003	97.72	299.9
2004	87.34	268.05
2005	113.97	349.76
2006	147.64	453.1
2007	113.66	348.8
2008	48.24	148.04
2009	77.2	236.93
2010	40.55	124.44
2011	81.03	248.68
2012	138.63	425.44
2013	129.93	398.75
2014	79.76	244.78

2015	85.69	262.98
2016	92.15	282.79
2017	7.54	23.13
2018	68.52	210.29
2019	68.74	210.94
2020	98.23	301.47
2021	77.52	237.92
2022	84.53	259.43
2023	31.95	98.05
NR means no record available		
2023 doesn't account for last three months of year		

In addition, site photos of the well head and interior building piping are provided below in Figure 11 and Figure 12.



Figure 11. SMW Well Head



Figure 12. Sheep Mountain Wellhouse Interior Piping

4.3.2 Supporting Hydrogeology

The locations of Sheep Mountain Well No. 1 well and LBES are shown in Figure 9. The well and spring are located within the La Bonte Groundwater and Box Elder Compartments, respectively (Garland, 1996). The well produces water from two major zones in the Casper Formation: (1) a fractured, well-indurated sandstone from 471 to 580 feet where air-lift production was observed to be between 300 and 500 GPM and (2) a fractured limestone from 1,162 to 1,165 feet (TriHydro, 1990).

As a scope alteration, HDR had proposed a desktop level examination of the tributary/non-tributary basis determination as it relates to Sheep Mountain Well No. 1 and whether there is an argument that it is non-tributary to the North Platte River

and should not be subject to the Platte River Recovery Implementation Program (PRRIP) rules. This section provides a discussion of the HDR Team reasoning why this well and others completed in the Paleozoic Aquifer need additional study to conclusively determine whether such completions are tributary to the North Platte River.

The groundwater pumping effects on surface water in accordance with the PRRIP are based on a method that was originally defined in the 2001 Modified North Platte Decree (Decree). “A hydrologically connected groundwater well is one that is so located and constructed that if water were intentionally withdrawn by the well continuously for 40 years, the cumulative stream depletion would be greater than or equal to 28 percent of the total groundwater withdrawn from that well” (Interstate Streams Division, 2006). This empirical method (AWAS Model) is applicable to an alluvial well completed in a shallow unconsolidated aquifer (homogeneous, isotropic conditions) adjacent to a stream but is more questionable when considering a deeper well completion into steeply dipping, fractured non isotropic bedrock within a faulted compartment such as the Paleozoic Aquifer.

As previous discussed, Weston, 2015 completed an analysis of the “connectivity of the Sheep Mountain Well No. 1” and presented their findings in a Technical Memorandum. Weston recommended conducting a more complex modeling effort such as MODFLOW to determine if Sheep Mountain Well No. 1 is indeed connected to the North Platte River. A numerical model may be of value, but further data collection would be needed to complete the modelling effort. HDR believes that the City of Douglas should develop a data collection strategy that would provide valuable data for either a qualitative argument or a semi-quantitative modeling argument that would serve as the basis for the non-connectivity argument to the Nebraska and Wyoming SEO North Platte coordinators. HDR has proposed a data collection program that would be concentrated on addressing the Box Elder and La Prele Groundwater Compartments.

In summary, HDR is recommending that the City implement monitoring of other Paleozoic aquifers in the region to decide the true connectivity of the well. Springs and seeps from the Paleozoic are clearly tributary to the North Platte River, but the total volume of groundwater flowing in deeper zones and associated with the current Sheep Mountain No.1 well completion would bypass the river and likely flow into the Powder River Basin. The water intercepted in this well completion likely enters a different and non-tributary groundwater circulation pattern. Monitoring could include:

1. The observation of existing wells in the area (for example, Green Valley No. 1, Casper-Meyer No. 1, and Little Box Elder Well No. 1).
2. Construction of additional monitoring wells including a nested well adjacent to the North Platte River. This nested monitor well program would define:
    i. The depth of the Paleozoic Aquifer system
    ii. Characterize the vertical groundwater flow pattern
    iii. Allow for flow measurements from tributary streams/spring to the North Platte River
3. Develop rating curves, implement staff gages and/or weirs to measure springs and seeps in the area and aid in the overall monitoring network efforts.

Critical in any effort to measure and monitor deep or shallow groundwater is access to and construction/implementation of flow measuring devices. This is particularly important in the measurement of springs and seeps. For example, many of the springs and seeps found by Garland in 1986 have provided valuable hydrogeologic data for this study but many have not been visited since that time.

With this in mind the City and/or representatives of the State might consider sponsoring a University of Wyoming (UW) student(s) to continue research related to the connectivity of the Paleozoic aquifer to the North Platte River. A landowner might be more willing to allow access to their property to a student from the UW than a consultant or an employee of the state of Wyoming. Garland's 1986 study has been invaluable for the understanding of the Paleozoic aquifer, and a future study of the connectivity of the aquifer to the North Platte River would also be invaluable.

4.3.3 Water Rights

The water rights for the Sheep Mountain Well are shown in Table 12. Permits and Certificates of Appropriation can be found in Appendix A.

Table 12. SMW Water Rights

Use	Permit Number		Name	Appropriation	Priority Date	Comments	Comments
Municipal	97415.0	W	Sheep Mountain Well No. 1	3.21 cfs (1200 GPM)	4/17/1990	Considered tributary to NPR in the Wyoming Depletion Plan	Limited to a pumping capacity of 3800 ac-ft over 10-year period, 475 ac-ft per year
Test	217234.0	W	Sheep Mountain No. 2 Exploration Well	0	6/24/2022	Test well from WWDC Level 2 Funding	Permit set to be cancelled December 31, 2024*
*Sheep Mountain No. 2 has been completed, further evaluation for utility pending. **Compiled From Wyoming SEO Records (State of Wyoming Engineer's Office, 2025b)**							

Permit no. UW 97415.0W is for Sheep Mountain Well No. 1. This permit, with a priority date April 17, 1990, is for a supplemental supply to the City of Douglas' municipal water system. The total appropriation amount for this well is 1,200 GPM. It should be noted that although the permit has an adjudicated right of 3.21 cfs, there is an additional condition that the well cannot produce more than 3,800 ac-ft of water in a 10-year period and no more than 475 ac-ft in a calendar year. In addition, the well is reaching a groundwater production capacity of the well relating to well construction of the SMW #1 and the transmissivity of the formation, that lowers actual production to around 50 percent of the adjudicated right.

The second permit in Table 12 is Permit no. UW 217234.0W for a test well, funded by the WWDC in the Sheep Mountain Anticline. The landowner is Bedtick Ranch, LLP, and access was granted through a Temporary Easement and Access Agreement between the Wyoming Water Development Commission and Bedtick Ranch, a Limited Partnership, which expires May 4, 2026. The well is located northwest of Sheep Mountain Well No. 1. The proposed depth of the well was 1,350 feet, and the anticipated production zone was 550 to 1,350 feet. This permit does not have an appropriation amount as it is for testing purposes only. As of the date of writing, the test well has not been completed due to issues encountered while drilling. Drilling commenced at this well site in 2023 by Cohoy Pump Service (Cohoy), Cheyenne, Wyoming. As drilling progressed, continual problems impacted schedule and the completion of the well. The Cohoy well was abandoned in 2024.

The permit was set to be cancelled on December 31, 2024, but an extension was requested and granted. The redrilling of Sheep Mountain Exploratory Well No. 2 began in 2025 and was completed in May 2025. The well drilling contractor is White Mountain Operating, Pinedale, Wyoming. The depth of the well remains 1,400 feet. Both water quality data and pump testing data were collected after the completion of the well. Initial water quality data indicates that the water is high in radionuclides. Pump testing data indicates a relatively low yield of less than 200 GPM. Currently, a blending analysis is being conducted with Sheep Mountain Exploratory Well No. 2 and water from LBES to evaluate the viability of Well No. 2 as a suitable water source for the City of Douglas.

4.3.4 Water Quality

Water quality analysis was conducted from records received by the City, based on EPA testing regulations mentioned above. For Sheep Mountain Well, the regulations are tabulated below, with each contaminant accounted for by a minimum, maximum, and average value over the testing period of 2013 to 2024. Secondary Standards data can also be seen in Appendix C.

Table 13. SMW Water Quality Data

Parameter	4002 Gross Alpha	Gross Beta	4000 Gross Alpha - Adjusted	4006 Uranium	4010 Radium 226 + Radium 228
Unit	pCi/L	pCi/L	pCi/L	mg/L	ug/L
Maximum Contaminant Level	15	4mrem/yr	15	0.03	5
Min	6.5	---	-3	0.013	0.4
Max	17.5	---	5	0.014	1.7
Average	12	---	1	0	1
Parameter	1005 Arsenic	1010 Barium	1075 Beryllium	Copper	1025 Fluoride
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	0.01	2	0.004	1.3	4
Min	0.007	---	0	---	0.5
Max	0	---	0	---	0.7
Average	0	---	---	---	0.58
Parameter	Nitrogen, Nitrate + Nitrite as N	1045 Selenium	Sulfate	1085 Thallium	2216 Chloroethane
Unit	mg/L	mg/L	mg/L	mg/L	ug/L
Maximum Contaminant Level	11	0.05	250	0.002	200
Min	1	0.002	78	0	---
Max	0.8	0.004	81	0.0004	---
Average	0.8	0.003	80	---	---

Parameter	2943 Bromodichloromethane	2942 Bromoform	2944 Chlorodibromomethane	2941 Chloroform	2210 Chloromethane
Unit	ug/L	ug/L	ug/L	ug/L	ug/L
Maximum Contaminant Level	80 (combined)			80	N/A
Min	---	---	---	---	---
Max	---	---	---	---	---
Average	---	---	---	---	---
Parameter	Nitrates	1022 Copper	--- Indicates a Non-Detection Reading		
Unit	mg/L	mg/L			
Maximum Contaminant Level	10	1.3			
Min	0.79	---			
Max	1	---			
Average	0.81769	---			

4.4 North Platte River

4.4.1 Source Background Information and History

The NPR runs through the City of Douglas and is a large source of water in the summer months when consumption increases. A water treatment plant was built in the late 1970s to allow the surface water to be used for non-irrigation purposes. The current treatment plant runs during the summer months when water use is high. Currently, the WTP encounters operational difficulties during summer months, especially when runoff events are introduced to the river system.

Figure 13 shows the existing intake structure from the NPR to the WTP.



Figure 13. WTP Intake Structure from the NPR

4.4.2 Water Rights

The rights that the City of Douglas has to the NPR are shown below in Table 14.

Table 14. NPR Water Rights

Use	Permit Number	Designation	Name	Appropriation Amount	Priority Date	Comments	Comments
Municipal	6101.0	D	Douglas Canal ACT Reno Maurer Pump Ditch, Thence to The Town of Douglas Pipeline	1.23 cfs	7/7/1904	CR CC 72/365 details appropriation limited to 263.52 ac-ft/yr	Docket I-77-1-17 details change of use from irrigation to municipal
	9903.0	D	Douglas Pipeline	4.5 cfs	6/15/1910	WTP use	
Recreational	22594.0	D	Community Club Sprinkler System	1.24 cfs	5/26/1965	Change of use from irrigation to recreational	Docket I-2003-4-1
	6471	E	First Enlargement of Community Club Sprinkler System	0.67 cfs	5/10/1973		
Industrial	12963	R	Douglas WTP Reservoir	0 (storage)	7/2/2007	6.28 ac-ft of storage for WTP use	
Water Haul	36881	D	Douglas WTP Water Haul	1.11 cfs	4/14/2023	Time limited, expires 5/2/2025	
Compiled From SEO Records (State of Wyoming Engineer's Office, 2025b)							

ADJUDICATED WATER RIGHTS

The City of Douglas currently holds two rights to the NPR for municipal use. The first right, under P6101.0D, is for use during the irrigation season. Docket I-77-11-17 details a change of use for this right from irrigation to municipal. The certificate of record held by the City under this permit has an appropriation capacity of 1.23 cfs. This appropriation is limited to the irrigation season and is capped at 263.52 ac-ft/yr with a priority date of July 7, 1904. The second right, under Permit No. 9903.0D, is for the use of diversion of water from the NPR. This right gives an additional 4.5 cfs of water to be used for municipal purposes. This permit has a priority date of June 15, 1910. Both permits are diverted into the Douglas WTP for treatment and distribution to the water system.

Permit Nos. 22594.0D and 6471.0E provide water to the Community Club sprinkler system. These rights total 1.91 cfs to water the community system. A change of use was issued in Docket I-2003-4-1 to change from irrigation to recreational use. These permits have a priority date of May 26, 1965, and May 10, 1973, respectively.

The other permit of note is Permit No. 12963.0R, a reservoir permit for the Douglas WTP. This permit allowed for the creation of sedimentation ponds for pretreatment at the plant. These reservoirs have a storage capacity of 6.28 ac-ft.

WATER HAUL PERMIT

The City of Douglas also holds a water haul permit for the NPR. Permit No. 36881.0D is similar to Permit No. 36880.0D, with the only difference being the source of supply. The cfs rate is the same as Permit No. 36880.0D, reaching a maximum of 1.11 cfs. This permit is for the same use of oil and gas development as the LBES permit. It expired on May 5th, 2025.

4.4.3 Water Delivery

The WTP for the City of Douglas was redesigned in 2008 by CH2M Hill from the original design by Henningson, Durham & Richardson (now HDR Inc.) in late 1978. The operation of the treatment plant is described below. The first section is the pre-sedimentation process. Low lift pumps at the intake structure transport water from the NPR into the pre-sedimentation basins. These basins have a 6-inch inlet from the river and a capacity of 1 MG each. A site photo of a pre-sedimentation basin can be seen below in Figure 14.



Figure 14. Pre-sedimentation Basin

The second step in the train is the filtration process. Water from the pre-sedimentation basins is then fed into slow sand filters. These filters are meant to reduce bacteria, turbidity, and organic matter from the influent water to ensure the finished water turbidity complies with the requirements of the Surface Water Treatment Rule. These filters are usually adequate for waters with lower turbidities (<10 nephelometric turbidity units (NTU)); however, due to the conditions of the NPR, the turbidity levels can far exceed that 10 NTU rule of thumb (Lahlou, 2000). Due to this, these filters experience long down times due to clogging issues. In these turnaround periods, operators are required to remove and clean the top of the filter media. This process is laborious and requires extensive man-hours to accomplish. The pre-sedimentation basins were designed to address this potential issue, although no meaningful drop in NTU can be seen between the basins and the filters. Figure 15 and Figure 16 below are site photos of the filters.



Figure 15. Slow Sand Filters at Douglas WTP



Figure 16. Filter 3 at Douglas WTP

The third and final operation of the WTP is the disinfection process. The water is disinfected with in-pipeline chlorine gas then enters the clearwell for proper contact time before being discharged into the water distribution system. Full design specifications and criteria from the 2008 CH2M Hill plant re-design can be seen in Appendix B- Operating and Design Criteria.

Although the treatment plant is designed for a 2 MGD capacity of produced water, the current maximum production rate is around 550,000 GPD. These issues arise from large river turbidities clogging the filters and low efficiency of the filters in

water production, as discussed above. Plant operators have stated that the plant cannot operate when river turbidities are above 50 NTU, so the plant must be shut down during events where this condition occurs. These operational issues impact the usefulness of the plant during spring runoff and high turbidity events during the summer. **A key step in improving Douglas' water supply availability and use efficiency is to upgrade the WTP to mitigate issues with the current WTP and be able to treat a larger range of influent water qualities.**

4.4.4 Water Quality

Water quality analysis was conducted from records received by the City, based on EPA testing regulations mentioned above. For the Douglas WTP, the regulations are tabulated below in a manner where each contaminant is accounted for by a minimum, maximum, and average value from 2013 to 2024. All results are in-line and complaint with expected values for this water source. Secondary Standards data can be found in Appendix C.

Table 15. NPR Water Quality Data

Parameter	4002 Gross Alpha	Gross Beta	4000 Gross Alpha - Adjusted (calculated value)	4006 Uranium	4010 Radium 226 + Radium 228
Unit	pCi/L	pCi/L	pCi/L	mg/L	ug/L
Maximum Contaminant Level	15	4mrem/yr	15	0.03	5
Min	0.6	---	-0.9	0.0054	0.5
Max	8.4	---	0.6	0.0061	0.5
Average	3.82	---	-0.15	0.00575	0.5
Parameter	1005 Arsenic	1010 Barium	1075 Beryllium	Copper	1025 Fluoride
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	0.01	2	0.004	1.3	4
Min	0.002	---	---	---	0.3
Max	0.002	---	---	---	0.4
Average	0.002	---		---	0.33
Parameter	Nitrogen, Nitrate + Nitrite as N	1045 Selenium	Sulfate	1085 Thallium	2216 Chloroethane
Unit	mg/L	mg/L	mg/L	mg/L	ug/L
Maximum Contaminant Level	11	0.05	250	0.002	200
Min	---	0.003	94	---	---
Max	---	0.003	112	---	---
Average	---	0.003	103	---	---
Parameter	2943 Bromodichloromethane	2942 Bromoform	2944 Chlorodibromomethane	2941 Chloroform	2210 Chloromethane
Unit	ug/L	ug/L	ug/L	ug/L	ug/L

Maximum Contaminant Level	80 (combined)			80	N/A
Min	14	---	1.4	32	---
Max	21	---	2.5	52	---
Average	15.66667	---	2.1	43.33333	---
Parameter	Nitrates	1022 Copper	--- Indicates a Non-Detection Reading		
Unit	mg/L	mg/L			
Maximum Contaminant Level	10	1.3			
Min	0.8	---			
Max	1.01	---			
Average	0.90769	---			

TURBIDITY

Due to the nature of how Douglas treats its surface water, it is also important to account for both raw and finished water turbidity leaving the treatment plant. Below is Table 16 showing the minimum, maximum, and average turbidities over the period from 2020-2023.

Table 16. Turbidity Data from Douglas WTP (NTU)

	Raw Water for NPR			Finished Water Post Chlorination		
Year	Minimum	Maximum	Average	Minimum	Maximum	Average
2020	4.13	26.21	14.05	0.05	0.08	0.06
2021	4.61	167.00	32.76	0.04	0.06	0.05
2022	2.28	104.04	25.70	0.06	0.09	0.07
2023	8.48	600.00	126.80	0.04	0.05	0.04

It can also be noted that these values were based upon daily data received when the treatment plant was online during the summer months. It should also be noted that the treatment plant was not in true operation during the highest turbidity events due to the water quality of the river at the time; rather, the influent monitor captured readings while the plant was not in operation. Due to these large turbidity values that have been seen, the plant is not in operation for large periods of time. These time periods where the plant is not in operation are typically when water demand is the highest, making water delivery throughout the city difficult. In addition to the large downtimes, the startup of the plant also takes a considerable amount of time after a flash event, prolonging no treated water coming out of the plant.

A final consideration for the treatment plant is the breach of LaPrele Dam on April 1, 2025 due to significant structural integrity issues. The lack of flow control in the river until the new dam is complete may cause higher turbidity levels. The dam was breached above the sediment line of the dam, limiting the possibility of sediment reaching the mainstem of the NPR. This is not to say that the buildup can overtop the breached structure and cause potential operational issues of the WTP. The flows with potential to be sediment rich are expected before the startup of the WTP; however, that is not to say that abnormal sediment characteristics will not be seen during operation.

4.5 Overall Municipal Water Sources Review

The preceding sections define water quantity, water quality, and water use of the City of Douglas' current water supply. The following sections will address actual production, limitations, and concerns related to the City's water supply. The later sections will address water supply improvements and hydrologic alternatives for additional supply sources. Figure 17 details the true production limits of each water source in comparison to the appropriation amount allotted by the SEO.

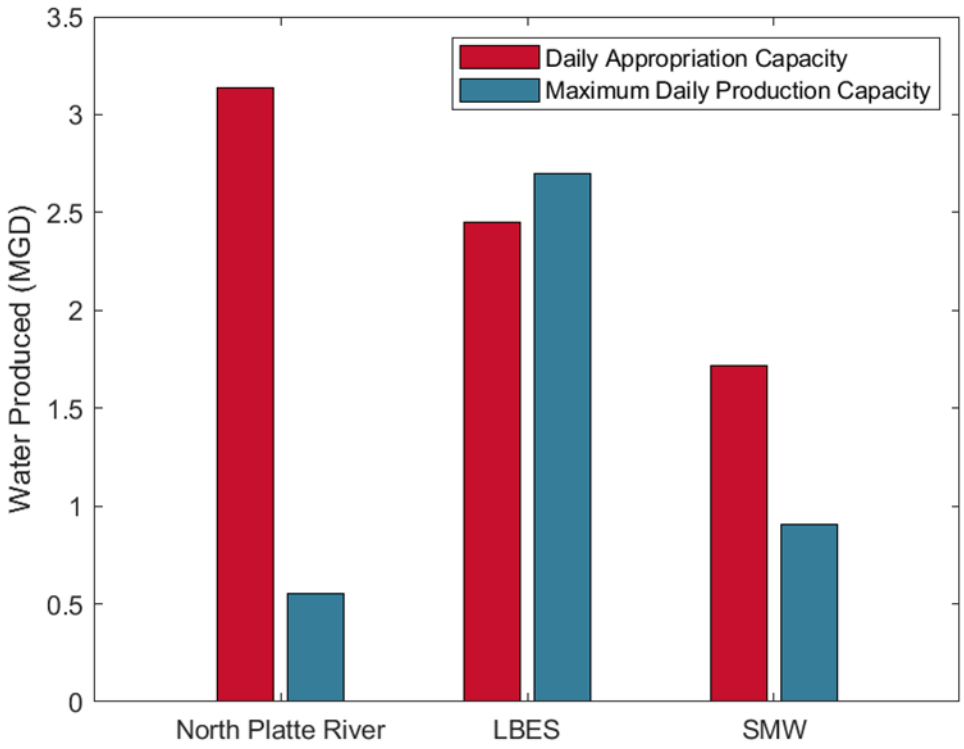


Figure 17. Water Sources Production Evaluation

This figure shows a large portion of the NPR, as well as Sheep Mountain Well, are not being used. For the NPR, over 1.1 MGD of the slightly over 3 MGD appropriation cannot be used due to the treatment plant being limited to 2 MGD. On top of this, the treatment plant can only reliably produce around 0.5 MGD, 25% of its actual capacity.

It should be noted that this production capacity is reflective of the irrigation season allotment of the NPR, which is 0.36 cfs greater than in non-irrigation season. This brings the true production capacity of the NPR to 16% of the allotted water right.

It should also be noted that diversions for the golf course were not considered in this evaluation as no data was available. Therefore, the true allocation of the NPR being

used is significantly higher, likely north of 1.5 MG due to the raw water diversion. The Sheep Mountain Well is similarly limited, producing only around 50% of its allotted limit (0.9 MGD) due to the to well construction of the SMW #1 and the transmissivity of the formation.

Finally, LBES, the main water source of the City of Douglas, shows that it can produce more water than what is permitted by the water rights (2.7 MGD vs 2.45 MGD). This number suggests that the total water the spring is capable of producing exceeds the adjudicated allocation. As stated in the water rights section, the allocation was reduced by a certificate of adjudication after the change of use from irrigation to municipal which explains the potential for higher production that what is currently adjudicated. In addition to this evaluation, the percentage of supply for the year 2023 was shown broken down by source in Figure 18.

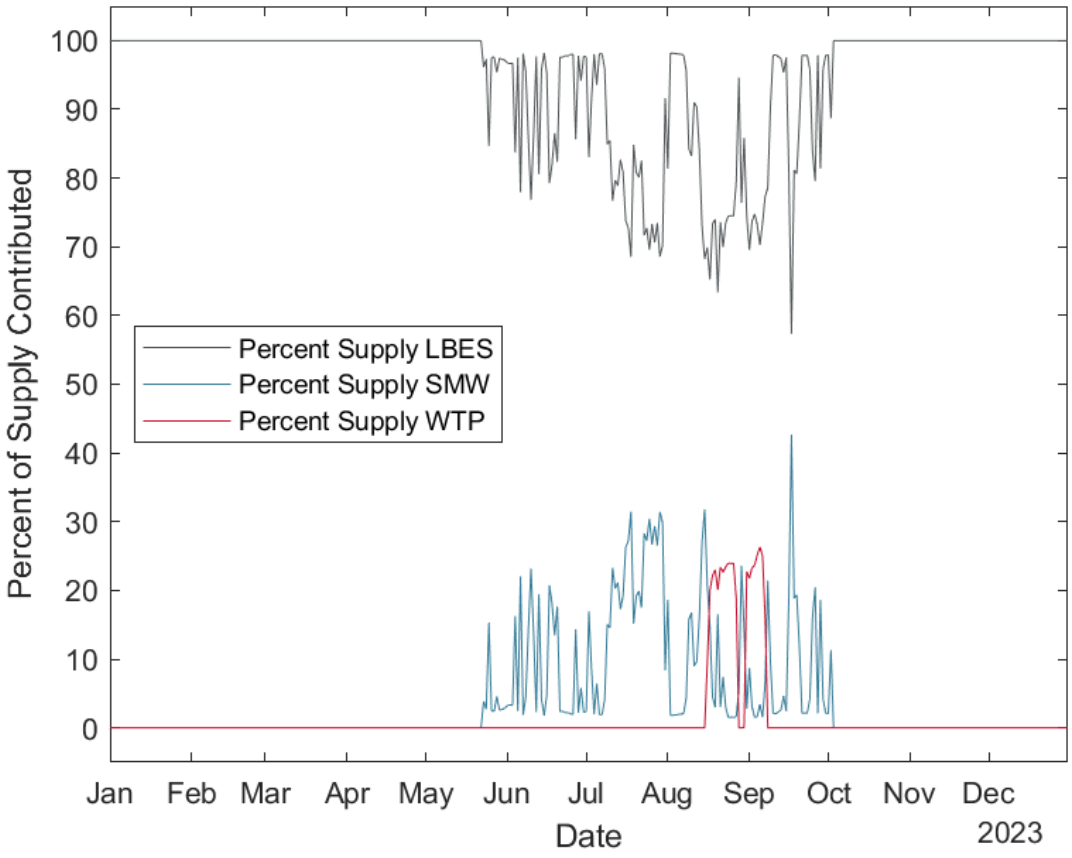


Figure 18. Percent Supply of Douglas Water Sources

Figure 18 demonstrates the City's reliance on LBES during the winter and spring months; during the summer and fall, the SMW and the WTP supplement the City's supply. It should be noted that the WTP was not online for most of the summer of 2023 and was operational only between August and September.

4.6 Estimated Irrigation Water Usage Goals

Raw water irrigation requires a large amount of water to effectively operate, dependent on areas irrigated. The appropriate and adequate usage of water for these systems is a critical component of smart water usage. The purpose of this section is to evaluate the optimal irrigation water usage required for land within the City of Douglas. This analysis is of particular importance to the maintenance and continued operation of water for use in green spaces.

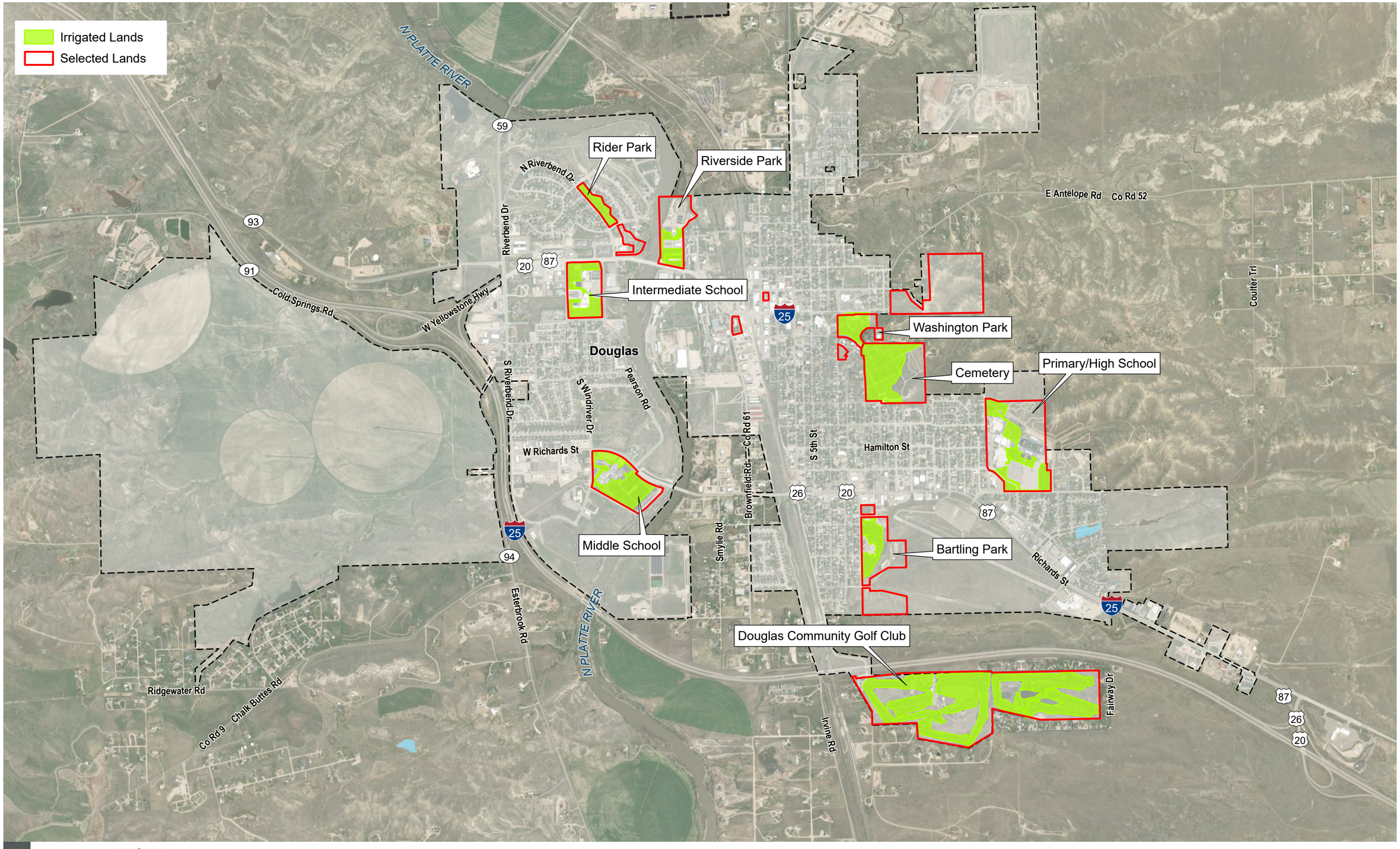
It should be noted that this analysis considers both the raw water system as well as municipal treated water for irrigation purposes and provides an estimate for each major green space. Major green spaces are areas larger than four acres where the City is irrigating.

This assessment will be helpful in determining if certain areas are receiving too much or not enough water to meet irrigation needs. Commonly, water is overused in irrigation of municipal green spaces, and this challenge presents an opportunity for increased efficiency in water use for the City. Areas for estimating water usage were obtained from Converse County GIS.

The lands of interest for this section include the Douglas Community Golf course, Bartling Park, Rider Park, River Side Park, Douglas Park Cemetery, Washington Park, and Douglas public schools. Acreage of each parcel of land was found using property ownership for Converse County, ArcGIS online, and Google Earth (Converse County, 2024). Land was located using property ownership for Converse County and ArcGIS online/Google Earth was used to find the total irrigated area in each parcel as shown in Figure 19. In addition, the table below provides the overall areas of lands evaluated.

Table 17. Acreage of Locations

Location	Acreage
Douglas Community Golf Club	81.6
Bartling Park	8.57
Rider Park	5.25
River Side Park	4.51
Douglas Park Cemetery	23.6
Washington Park	7.73
High School	14.31
Middle School	17
Intermediate School	11.22



\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039964207.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 4/30/2025

Figure 19. Douglas Irrigated Lands

Evapotranspiration (ET) was used as a method to estimate the overall water needed to irrigate the green spaces of Douglas. ET is the process that describes the movement of water from the surface into the atmosphere and is the combined rates of transpiration (losses through capillary action in vegetation) and evaporation (heat-driven vaporization of liquid phase water). ET is highly dependent on vegetation type and species, soils, surrounding climate, as well as a multitude of other factors. Since the City occupies a dry and arid environment, the impacts of evapotranspiration are especially important to quantify.

4.6.1 Methods

Two separate methods of calculating ET were used and compared against one other to establish a range of values. The University of California Cooperative Extension (UC Method) developed the first method used in this study. This method involves multiplying a reference evapotranspiration (ET_o) by a plant specific factor (PF) and the land area (LA) in square feet. This is then multiplied by a conversion factor to get gallons of water (Pittenger & Shaw, 2013). The equation can be seen below.

$$Gallons\ of\ Water = ET_0 * PF * LA * 0.62$$

Equation 1. UC Method Equation

This equation was adjusted to account for crop coefficients (K_c) and a conversion from acre-inch to gallons to produce the equation below.

$$Gallons\ of\ Water = \ ET_0 * K_c * LA * 27154.28$$

Equation 2. Adjusted UC Method Equation

The second method, developed by the United States Golf Association, is like the UC method; however, it considers the effective rainfall of the area as well (Gross & Hartwiger, 2016). This equation can be seen below.

$$Gallons\ of\ Water = (ET_0 * K_c - R_e) * LA * 27154.28$$

Equation 3. USGA Equation

Where R_e is the effective rainfall in inches, effective rainfall can be taken as 0.5 of the total rainfall over a given period.

These two methods described above are the basis of the irrigated water usage for the City of Douglas. Results from these two quantitative methods will be discussed in the results section.

A key point to consider is where to obtain values for Et_o, K_c, and rainfall totals. In relation to Et_o, no current studies to describe the evapotranspiration of irrigated land in Douglas have been completed. Consequently, sources such as the United States

Geological Survey (USGS) and OpenET were used to estimate the overall ET numbers.

A paper from the USGS, titled "Evapotranspiration Rates at Selected Sites in the Powder River Basin, Wyoming and Montana", was used as a basis of ET rates near Douglas. Site six in the paper lies approximately 30 miles northeast of Douglas on the Dry Fork of the Cheyenne River (Lenfest Jr., 1987). Due to its proximity to the City, it was chosen as a reasonable approximation of ET rates for Douglas. OpenET is an open-source climate modeling software that uses an ensemble model to estimate ET values in specific regions (*OpenET Data Explorer*, n.d.). These values can be directly taken for any parcel of land. Below is a table of ET values for the months of June to October.

Table 18. ET Values for Various Sources

Month	ET Number (in)	
	USGS Paper (Site Six)	OPEN ET
June	3.6	4.77
July	3.8	5.78
August	3.2	4.13
September	2.5	3.28
October	1.8	2.14

The K_c values found were taken from the University of California Center for Landscape & Urban Horticulture. This table was for turfgrasses, which is the assumed crop for all City of Douglas green space. It should be noted that due to Douglas' climate, the cool season grass K_c was used rather than warm season.

Table 19. Crop Coefficients for Turf Grasses

Month	Cool-Season	Warm-Season
June	0.88	0.68
July	0.94	0.71
August	0.86	0.71

Month	Cool-Season	Warm-Season
September	0.74	0.62
October	0.75	0.54
Adapted from (UCANR, 2024)		

Finally, total rainfall data for the selected months (June-October) were found using Western Regional Climate Center rainfall data for the 1981-2010 period of record. These numbers can be seen below.

Table 20. Average and Effective Rainfall Data for Douglas, WY

Month	Average Rainfall (in)	Effective Rainfall (in)
June	2.02	1.01
July	1.42	0.71
August	0.93	0.465
September	1.18	0.59
October	1.42	0.71
Adapted from (WRCC, 2025)		

4.6.2 Results

For the results section, it should be mentioned that the overall period of evaluation is from June to October due to the limitations on available ET data. This is closely reflective of the overall irrigation season of May to September.

Below are the results from the calculation methods used to evaluate the optimal amount of water needed to irrigate the specific lands owned and operated by Douglas. These results are broken into two tables, each corresponding to one of the calculation methods.

Table 21. Theoretical Irrigation Water Demand in Gallons Based on Calculated Evapotranspiration (UC Method)

UC Method		
Location	USGS Paper	Open ET
TOTAL	59,920,000.00	81,266,000.00

Table 22. Theoretical Irrigation Water Demand in Gallons Based on Calculated Evapotranspiration (USGA Method)

USGA Method		
Location	USGS Paper	Open ET
TOTAL	43,476,000.00	64,816,000.00

As can be seen by the results, the calculation methods paired with the varying ET values yield a large range of water that would be needed by Douglas when accounting for irrigation water usage. The amount of variation, north of 20 MG, is large enough to investigate these results further. The first method, UC Method, does not consider effective rainfall, which suggests an inaccuracy in the overall results. Therefore, the USGA numbers provide a more accurate estimate of total water required for irrigated areas by considering total precipitation as usable water. In addition, when comparing the ET values between the two sources above, the OpenET numbers are the only ET values that were calculated for Douglas specifically. Although the USGS numbers are close in proximity to Douglas, they are far less accurate than the numbers calculated within city limits.

Taking the Open ET numbers into consideration, the total amount of water needed to sufficiently supply the irrigated acres of Douglas is around 64 MG. Within that 64 MG, 56% of this would be raw water with the remaining 44% being from the municipal water system.

4.6.3 Recommendation

Douglas should closely monitor meter data on irrigated lands. Using metering systems would provide accurate water totals without any waste or overwatering. In addition, it should be stated that these numbers hold assumptions such as K_c values and ET values. To be more accurate, Douglas could also consider an independent ET study to obtain numbers more reflective of the City of Douglas itself.

5.0 Platte River Recovery and Implementation Program

5.1 Program Background and Implications

The Platte River Recovery Implementation Program (PRRIP) was established in 2007 by a three-state coalition consisting of Wyoming, Nebraska, and Colorado as well as the United States Department of the Interior. The parties agreed to participate in the joint program based on a cooperative agreement they signed in 1997.

In this program, currently in the second phase, the State of Wyoming is party to the Governance Committee that has a water goal to send 417,000 acre-feet of water to Nebraska through the Platte River (PRRIP Committee, 2006). This goal is to benefit four species affected by the Platte River environment in Nebraska. These species include the interior least tern, pallid sturgeon, piping plover, and the whooping crane.

To achieve this goal, State agencies for Wyoming, Nebraska and Colorado as well as the USBR are subject to tracking current water uses and compare water depletions based on water uses occurring between 1992 and 1997. Each municipality in Wyoming's North Platte Basin that takes or releases water through the Platte River Basin is subject to submitting depletion reports to the SEO. The SEO analyzes municipal water use and other water uses in the North Platte and translates the depletions to the Nebraska state line to verify depletion and accrual amounts in reference to benchmark depletion conditions from 1992-1997.

5.2 Existing Water Supplies

The PRRIP may impact the City of Douglas by affecting surface water and groundwater sources for the City that deplete or influence surface water within the North Platte River Basin. The groundwater pumping effects on surface water in accordance with the PRRIP are based on a method that was originally defined in the 2001 Modified North Platte Decree (Decree): "A hydrologically connected groundwater well is one that is so located and constructed that if water were intentionally withdrawn by the well continuously for 40 years, the cumulative stream depletion would be greater than or equal to 28% of the total groundwater withdrawn from that well" (Interstate Streams Division, 2006).

The "hydrologically connected groundwater" determination is based on the proximity of a water well location to a perennial stream of the NPR system as shown on 1:100,000-scale USGS topographic mapping, in accordance with the currently accepted "hydrological connection" methodology of the Groundwater Wells

Subcommittee of the North Platte Decree Committee (NPDC). The determination uses the Jenkins (1968) method for calculating the stream depletion factor. This method defines "stream depletion" as "either direct depletion of the stream or reduction of groundwater flow to the stream" (Jenkins, 1968).

The Jenkins (1968c) method requires that the user determine: (1) the horizontal distance (in feet) perpendicular to the closest perennial stream channel; (2) the aquifer transmissivity in gallons per day per foot: and (3) the aquifer storage coefficient (dimensionless).

$$Stream\ Depletion\ Factor\ =\ SDF\ =\ \frac{(d^2 * S)}{T}$$

Equation 4. Stream Depletion Factors

Where:

SDF = stream depletion factor (time in days for 28% stream depletion);

d = the perpendicular distance from the pumped well to the stream (in feet);

S = the specific yield of the aquifer (or storage coefficient) (dimensionless);

T = transmissivity (in square feet per day); and

The Jenkins (1968c) stream depletion factor calculation method uses the following eight assumptions:

1. The transmissivity value for the aquifer does not change with time. For an unconfined ("water-table") aquifer, drawdown is considered to be negligible when compared to the saturated thickness.

2. The temperature of the stream water is assumed to be constant and to be the same temperature as the groundwater in the aquifer.

3. The aquifer is isotropic, homogeneous, and semi-infinite in areal extent.

4. The stream that forms the hydrologic boundary is straight and fully penetrates the aquifer.

5. Groundwater is released instantaneously from aquifer storage.

6. The pumping well is open to the full water-saturated thickness of the aquifer.

7. The pumping rate of the well is steady during any time period of pumping.

8. The stream is the sole source of recharge to the groundwater aquifer.

Unfortunately, this empirical method to determine the stream depletion factor from a pumping well is over 50 years old. Since that time other semi-analytical methods and computer groundwater flow models have been developed. Weston completed an analysis of the connectivity of the Sheep Mountain Well No. 1 and presented their findings in a technical memorandum (Weston Engineering, 2006). Weston's Alluvial Water Accounting System stream depletion analysis showed that the stream depletion factor of one was exceeded in less than one day. Weston recommended conducting a more complex modeling effort such as MODFLOW to determine if Sheep Mountain Well No. 1 is indeed connected to the NPR.

RECOMMENDATION:

Prior to conducting any groundwater modeling, HDR subconsultant CDLidstone recommends establishing additional baseline monitoring of the Paleozoic Aquifers. A monitoring well network could be established where the City of Douglas could install a production well(s) in the Box Elder and La Prele Groundwater Compartments. Laramie County has set up a groundwater monitoring network for the High Plains Aquifer and the data from these wells have been invaluable for groundwater management.

It would also be beneficial to measure springs and seeps in the area to assist in the overall monitoring network. This will require access, confining the water source (installing a flume box or similar means of flow capture), and installing a measuring device. Many of the springs and seeps identified by Garland (1996) have not been visited since 1996.

It would also be beneficial to measure the Warm Springs flow in Section 8, Township 31 North, Range 71 West. The results of the aquifer testing at Sheep Mountain No. 2 will also be valuable to argue in a future petition for the non-tributary status for Paleozoic Aquifers. In a letter dated December 21, 2023, Forsgren Associates, Inc. (Forsgren) requested permission from the owners (Mr. and Mrs. George Weiss) of Warm Springs on behalf of the City of Douglas to collect water quality samples and measure flow at the Warm Springs (B. Jordan, personal communication, 2023). Based on concerns for their water rights, access for installing a measurement device was refused.

The SEO completed an assessment of hydrologic connection between groundwater and surface waters within the North Platte River Basin. The outcome of the SEO assessment was a set of maps referred to as "Green Area Maps," which delineate areas presumed not to be in hydrologic connection for purposes of issuing permits for groundwater wells. The Green Area Maps were submitted for approval by the NPDC. The City of Douglas' current ground water sources, which include the SMW and the LBES, are considered tributary to the NPR.

The City of Douglas (Josh Oberlander) and Forsgren Associates, Inc. (Ben Jordan) met with Michelle Hubbard (SEO PRIPP Coordinator) on November 27, 2023 to discuss several topics. These included the status of the PRRIP and depletions, potential changes to the PRRIP, Pathfinder water banking status, and non-tributary wells status. Although not directly discussed, the retirement of irrigation rights guidelines was also considered. Ms. Hubbard indicated that the SEO had not received any applications for non-tributary well status for review, nor had they received a data submittal to support an application for non-tributary status.

5.3 Water Rights Administration

The 2001 Modified North Platte Decree ("Modified Decree") is an interstate settlement that places many reporting requirements on the State of Wyoming for existing water uses in the North Platte River Basin (Interstate Streams Division, 2006). The North Platte Basin is considered over-appropriated, meaning water supplies are not available to satisfy all the water demands of existing water users. The Modified Decree established water diversions and acreage limitations for irrigation within specific reaches of the NPR in Wyoming. In addition, the Modified Decree requires priority administration of reservoir storage water rights and other water appropriations in the North Platte basin during periods of drought when water supplies are not adequate to meet all the existing water needs.

Summary of North Platte Water Rights Discussion (*Final Settlement Stipulations No. 108, Orig STATE OF NEBRASKA, PLAINTIFF v. STATES OF WYOMING AND COLORADO*, 2000):

- Water Rights priority are based on oldest (most senior) waters first – when administration happens (affected water users are not able to take water), the youngest or "Junior" water right holders are regulated. If the water administration is based on water flows in the River, the progression of regulation may occur sequentially with the second youngest, then third, and so on until the amount of water required for the administration is met.

  - This means if administration happens, its not always going to affect Douglas.

  - If administration occurs due to fill a Federal Reservoir it will affect all "junior" Water right holders. This can occur in February, March, or April.

- Administration typically begins in February and could occur as late as July or August in the summer – will impact both groundwater and surface water diversions.

- Administration does not typically occur every year – it varies on the weather/climate of the year (wet/drought) and other factors such as the current amount of water stored in Federal Reservoirs in North Platte drainage.

The winter water rights administration date (February and March) corresponds to the U.S. Bureau of Reclamation's (USBR) timing for filing either the Guernsey Reservoir (April 20, 1923, priority) or the Glendo Reservoir (August 30, 1951, priority). At the beginning of April, senior priority administration may be related to the filling of the Inland Lakes in Nebraska (December 6, 1904).Under extreme prolonged drought periods, the late summer water rights administration is anticipated to follow the March 1, 1945, priority date for users within the North Platte River Basin. This priority date is anticipated during a water rights "call" due to the number of water diversions serving irrigation water needs in the reach of the NPR between the Guernsey

Reservoir and the Gray Reef Reservoir. The irrigators with pre-March 1, 1945 water rights are allowed under the Wyoming's Surplus Water Statute (WY Stat § 41-4-318, 2024) to divert up to 2 cfs per 70 acres of land allowing for a second cfs for every 70 acres of irrigated lands.

The City of Douglas water rights are listed according to water sources and water rights priority dates in Table 9, Table 12, and Table 14. The City of Douglas typically relies only on the LBES source with some supplement from the SMW (Permit No. U.W. 97415) and the WTP during the summer and fall months. The LBES spring rights totaling 3.80 CFS (2.67 MGD) are primarily senior to December 6, 1904. The SMW with pumping rights up to 2.67 CFS (1.73 MGD) should not be subject to water administration because pumping does not have short-term, direct effects on perennial tributaries or the mainstem of the NPR. No municipal right would be curtailed in the event of a late summer administrative call due to the priority dates associated with the rights. In relation to the SMW, rights would likely not be curtailed because the well has not been curtailed in the past during administration periods. Additional hydrogeologic investigation would need to be completed to ensure no curtailment in the proceeding years. The only rights that would likely be affected are the raw water diversions to the Community Club Sprinkler System.

In relation to groundwater, wells are subject to water rights administration if the well pumping or spring source diversion has a direct and immediate effect that depletes surface water. The SEO must make the determination that the regulation of said well will directly benefit downstream water users during the period of administration. If the depletion effects to surface water caused by the well pumping or spring diversion occur within a short time frame, i.e., within weeks of initiating any well pumping or spring diversion, then the source is subject to water rights administration.

5.4 Depletion Benchmarks

The Wyoming State Water Plan sets benchmarks for every municipality on the NPR due to the proceedings of the Decree. The depletion benchmark for the City of Douglas was set based on the 1994 water year. In this benchmark, it was found that the total baseline depletion was 1,127 acre-feet, which consists of 920 acre-feet in the irrigation season and 207 acre-feet in the non-irrigation season. Each year, the City of Douglas self-reports the depletion and accretion rate amounts at which the City diverts water to the Platte River and returns water to the North Platte drainage.

In the last five years, the benchmark during the irrigation season has been exceeded only once in the 2021-2022 water year. In comparison, during the non-irrigation season, the benchmark has been exceeded every year except for the 2019-2020 water year. Below is a table showing an analysis of the City of Douglas' depletion reports over the last five years. The table is broken down by depletion in the irrigation season, non-irrigation season, and the yearly totals. It also shows if the benchmark for the City was exceeded in the given season or year.

Table 23. PRRIP Benchmark Table

Water Year		Diversions					Water Sales		Return Flow				Benchmark	Benchmark Exceeded	Benchmark Exceedance
		Surface Water Diversions into Supply	Groundwater Deliveries into Supply	Surface Water Diversions into Irrigation	Total (MG)	Total (AF)	Total (MG)	Total (AF)	WTP Filter To Waste	Wastewater Effluent	Total (MG)	Total (AF)	AF		AF (+/-)
		Irrigation Season													
2018		16.2	294	51	361.2	**1108.5**	10.0	**30.8**	47.5	101.8	149.3	**458.3**	**920.0**	No	239.0
2019		27.7	300	1	328.9	**1009.4**	4.6	**14.1**	16.4	88.3	104.7	**321.4**	**920.0**	No	217.8
2020		21.4	329	0	350.2	**1074.7**	4.1	**12.5**	24.9	80.4	105.3	**323.1**	**920.0**	No	155.8
2021		39.6	323	68	430.3	**1320.4**	3.4	**10.5**	37.0	81.1	118.1	**362.6**	**920.0**	Yes	-48.4
2022		10.4	280	35	324.7	**996.6**	1.8	**5.5**	34.9	84.4	119.4	**366.4**	**920.0**	No	284.3
		Non-Irrigation Season													
2018		0.0	196	0	195.6	**600.1**	8.3	**25.6**	0.0	132.4	132.4	**406.2**	**207.0**	Yes	-12.5
2019		0.0	198	0	197.9	**607.2**	6.9	**21.3**	0.0	140.5	140.5	**431.3**	**207.0**	No	9.8
2020		0.0	188	0	187.6	**575.9**	2.5	**7.6**	0.0	110.4	110.4	**338.7**	**207.0**	Yes	-37.7
2021		0.0	187	0	187.2	**574.4**	3.7	**11.4**	0.0	113.5	113.5	**348.2**	**207.0**	Yes	-30.7
2022		0.0	195	0	194.6	**597.1**	2.9	**8.9**	0.0	111.5	111.5	**342.0**	**207.0**	Yes	-56.9
		Yearly Totals													
2018		16.2	489.5	51.0	556.8	**1708.6**	15.5	**47.6**	47.5	234.2	281.7	**864.5**	**1127.0**	No	235.3
2019		27.7	497.9	1.2	526.8	**1616.7**	11.5	**35.4**	16.4	228.9	245.3	**752.7**	**1127.0**	No	227.6
2020		21.4	516.3	0.2	537.8	**1650.6**	6.6	**20.1**	24.9	190.7	215.6	**661.8**	**1127.0**	No	118.1
2021		39.6	510.1	67.7	617.4	**1894.8**	7.1	**21.9**	37.0	194.6	231.6	**710.8**	**1127.0**	Yes	-79.0
2022		10.4	474.1	34.8	519.3	**1593.6**	4.7	**14.4**	34.9	195.9	230.8	**708.4**	**1127.0**	No	227.4

In addition to Table 23, Figure 20 and Figure 21 were developed showing the irrigation and non-irrigation season benchmarks and depletions in graphical format.

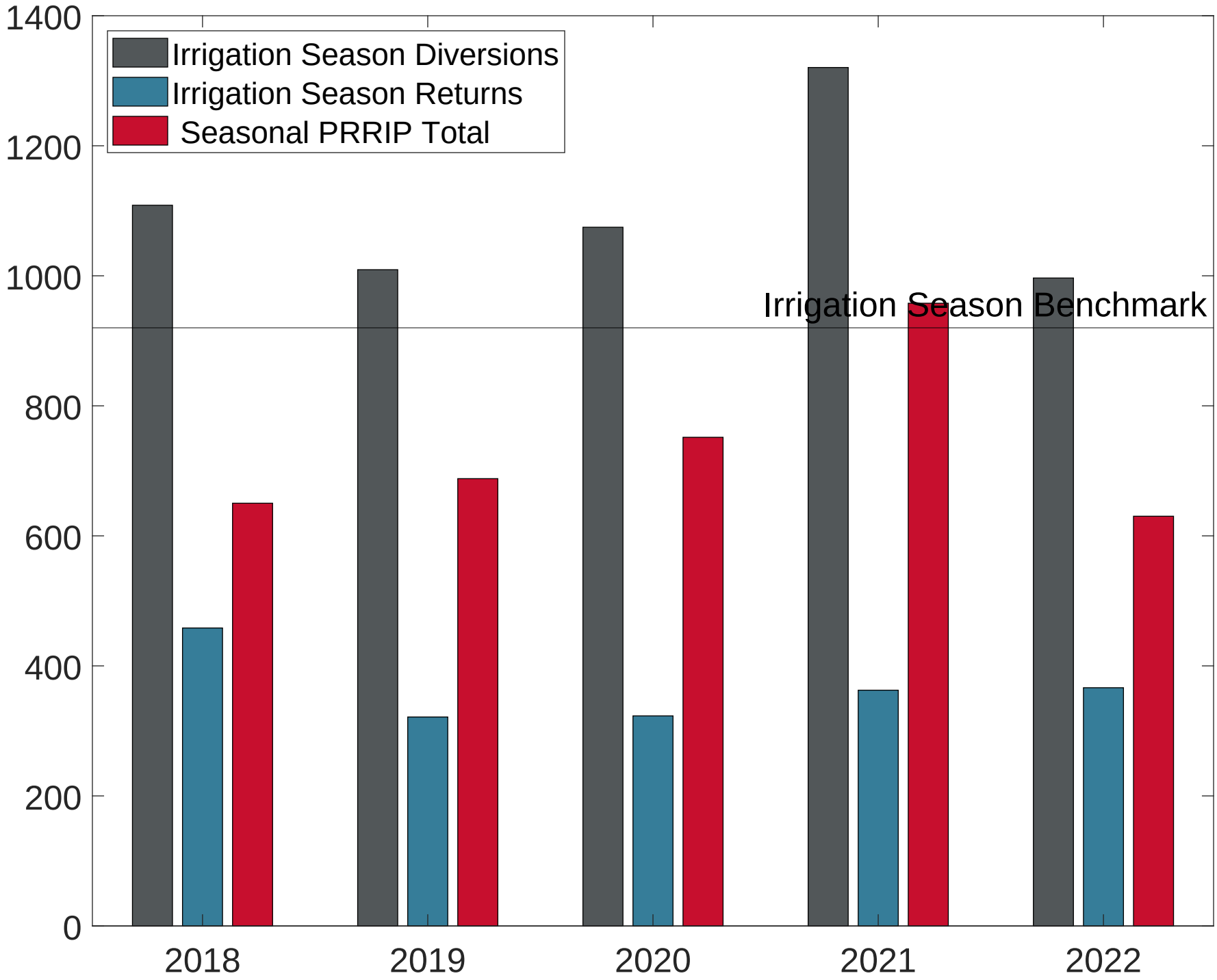


Figure 20. Irrigation Season Benchmarks, Depletions, and Returns

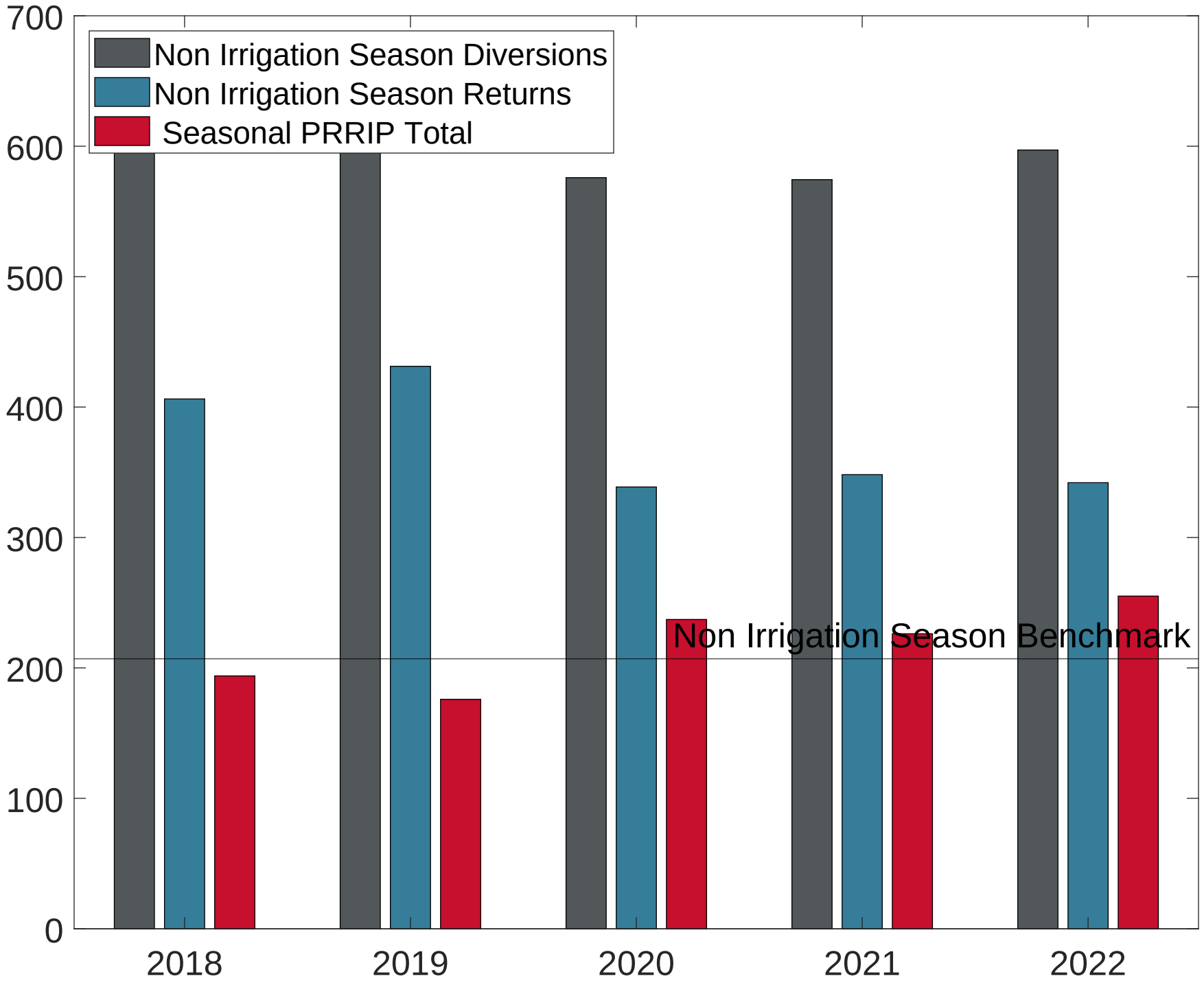


Figure 21. Non-Irrigation Season Benchmarks, Depletions, and Returns

These figures, as well as the table, illustrate the challenges faced by the City of Douglas due to the PRRIP. Douglas should consider water supply alternatives to augment the system's supply due to these exceedances of benchmarks.

6.0 Water Supply Alternatives

Water supply alternatives and their implementation for municipal use will be addressed in the following paragraphs. Options are limited by the location, nature, and characteristics of the new water source(s). Alternatives include both groundwater and surface water sources.

6.1 Purchasing of Water Rights

Alternatively, the City can also purchase water rights. The two pathways for purchasing water rights would be “connected” rights within the Platte River Basin or “Green Zone” or “unconnected” rights. If the priority date of the purchased right is before July 1st, 1997, the water rights would be tracked under an existing Wyoming benchmark, such as for existing irrigation water use.

The purchase and acquisition of “connected” water rights requires a Wyoming Board of Control petition to transfer the water rights from the existing water use to the proposed municipal water use (State of Wyoming Engineer’s Office, 2025a). The water rights are already accounted for under the Wyoming Depletion Plan. If the rights are connected to the Platte River Basin, transferring them to municipal use may justify an increase in the City’s benchmark amount, as the previous water use is retired upon transfer. If the City petitions for a change of use, the Board’s evaluation of beneficial use and return flows may lead to a reduction in the overall capacity available, depending on the type of use.

If the groundwater rights are in the “Green Zone” or “unconnected rights”, they do not fall under PRRIP requirements. If the return flows were discharged to the Platte River Basin, they would be considered an accretion, which would help offset the City of Douglas’ annual depletion total.

6.2 Enlargement of Current Rights

As the City grows in population and water demands increase, another water supply option for the City is to enlarge water use of adjudicated water rights (Permit No. 22594D and Permit No. 6471 Enl.). These water rights are leased for watering a private golf course under recreational use. This golf course water use is currently tracked as a raw water diversion within the City of Douglas’ depletion plan reports. The City could file a present-day priority enlargement application for municipal use with the Wyoming SEO and add the WTP intake as an alternate point of diversion for the original water rights. The water rights would be subject to water administration, but the process is much simpler than a water rights petition attempting to transfer a portion of the existing water rights from recreational to municipal use. In addition,

the City could pursue an enlargement of the LBES rights, as it has been shown that the Spring can produce more than what was adjudicated.

6.3 Storage Water Contracts

Another source of surface water is for the City to contract storage water from the Pathfinder Modification Project (PMP) Account. Long-term storage water contracts are currently available from the State of Wyoming from the Wyoming Water Development Commission (WWDC) at a readiness-to-serve rate of $5 per acre foot and a water purchase amount of $25 per acre foot. The storage water can only be relied upon during periods of water rights administration under the terms of the Decree.

Another temporary back-up water supply option is storage water from the Glendo Reservoir with contracts up to one water year at a water purchase amount of $75 per acre foot. The water is limited and is contracted on a first come, first serve basis at the beginning of the water year. There are no contract requirements limiting water availability to periods of water rights administration. These contracts would likely not be of use to Douglas, who has primarily senior water rights, in the event of an administration. However, in the event of high-water use in the early months of the year, this option could be useful.

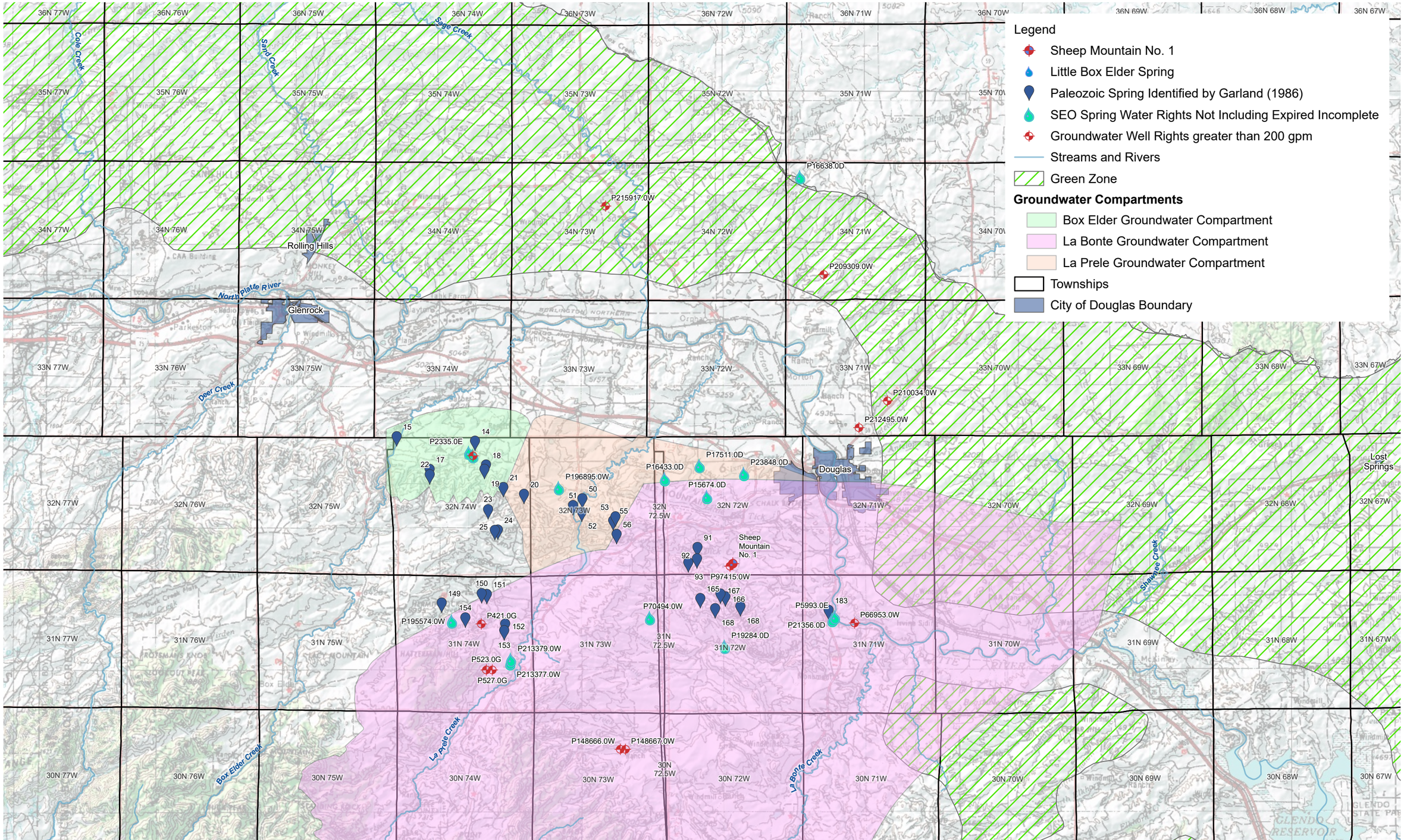
6.4 Current Status of Sheep Mountain Well No. 2

Sheep Mountain No. 2 well is considered “hydrologically connected” to the North Platte River Basin under the PRRIP and will be subject to review by the SEO Platte River Coordinator. This approval process will involve submitting both documentation about the new water source and a plan to show no effect on the surface water depletions of the North Platte Basin. If this well was proven to be “non-hydrologically connected,” the return flows associated with the new water source would be considered an accretion to the system, lowering the City of Douglas’ total depletion amounts each water year. Any additional groundwater from Sheep Mountain No. 2 could supply the City of Douglas via the existing Sheep Mountain transmission line, but this volume will count toward the PRRIP depletion. Hydrogeologic options and the potential for additional well drilling are addressed below.

6.5 Groundwater and Potential Well Drilling Alternatives

6.5.1 Existing Wells and Springs in Project Area

An inventory of the permitted water wells and springs within the project area is shown in Figure 22 below.



LOCATION OF PERMITTED WATER WELLS AND SPRINGS

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Figure 22. Locations of Permitted Rights Near Douglas

DOUGLAS, WY

A summary of SEO records for the wells and springs are presented in Table 24 and Table 25 respectively.

Table 24. Wells Adjudicated at More than 200 GPM

Use	Permit Number	Designation	Name	Appropriation Amount (GPM)	Priority Date	Static Water Level (ft)	Well Depth (ft)	Aquifer	Principal Water Bearing Formation Depth Top (ft)	Principal Water Bearing Formation Depth Bottom (ft)
Misc	148666	W	Wagonhound No. 1 Reservoir Supply Well	230	3/18/2002	---	1,400	Paleozoic	602	1,350
Misc	148667	W	Wagonhound No. 2 Reservoir Supply Well	225	3/18/2002	---	1,490	Paleozoic	742	1,490
Municipal	198039	W	Little Boxelder Well No. 1	600	3/15/2012	---	1,170	Paleozoic	12	1,170
Misc	210034	W	Western Sky 1	300	10/12/2018	220	2,646	Ft. Union	653	2,646
Stock	421	G	Cross #2	400	1/3/1956	15.5	93	Paleozoic	---	---
Domestic; Stock	523	G	Curtis #1	500	1/23/1957	20	90	Alluvial	20	90
Domestic; Stock	527	G	Curtis #5	900	1/23/1957	2	150	Paleozoic	10	80
Stock	66953	W	Daly State #1	210	3/27/1984	6.3	12.4	Alluvial	---	---
Municipal	97415	W	Sheep Mountain Well #1	1200	4/17/1990	365	1,172	Paleozoic	1,163	1,165
Compiled from Wyoming SEO Records (State of Wyoming Engineer's Office, 2025b)										

Table 25. Permitted Springs Near Douglas

Use	Permit Number	Designation	Name	Appropriation (CFS/GPM)	Priority Date	Stream Source
Domestic; Stock	15674	D	Rudd Pipeline and Tank	0.006	12/18/1919	Rudd Spring
---	16433	D	Schmeidlein Pipeline	0.1	8/1/1922	Spring
Domestic; Stock	16638	D	Harvey Spring Ditch	0.01	7/20/1923	Harvey Spring
---	16937	D	Douglas Pipeline No. 1	3.8	8/20/1923	Little Box Elder Spring
---	17511	D	Hart Water Systems	0.03	12/10/1928	Hart Spring
---	19284	D	Carothers Spring Ditch	0.784	10/12/1939	Carothers Spring
Stock	195574	W	Round Hill	25	4/22/2011	---
Stock	196895	W	Prospect Draw Spring	2	10/19/2011	---
Stock	213377	W	Summer Spring 1	7	10/19/2020	---
Stock	213379	W	Summer Spring 2	9	10/19/2020	---
---	21356	D	Warm Springs Swimming Pool Pipeline	1	1/29/1954	Warm Springs
Stock	214212	W	Summer Spring 3	25	3/25/2021	---
Stock	217901	W	Hippo No 1	25	10/11/2022	---
---	2335	E	Enl. Little Box Elder Ditch No. 4 ACT Douglas Pipeline Enlargement of Little Box Elder Ditch No. 4 Ditch	---	4/20/1910	Box Elder Spring
---	23848	D	Sportsman Spring Pipeline	0.056	5/22/1972	Sportsman Spring

Use	Permit Number	Designation	Name	Appropriation (CFS/GPM)	Priority Date	Stream Source
---	5993	E	First Enl. Warm Springs Swimming Pool (Pipeline) Enlargement of Warm Springs Swimming Pool Pipeline	0.36	1/19/1960	North Platte River
Stock	70494	W	Whitaker #3	7	6/27/1985	---
---	OR 02/473	---	Little Box Elder Ditch Co. No. 4 Ditch	---	06/20/1885	---
Irrigation	CR CA01/239	---	Spring Ditch	0.05	06/20/1881	Rice Spring
Irrigation	CR CA01/240	---	Spring No. 2 Ditch	0.15	06/20/1887	Howard Spring
Irrigation	CR CB01/239	---	Spring No. 1 Ditch	0.09	12/31/1884	Howard Spring
---	CR CB01/301	---	Little Box Elder Ditch Co. No. 4 Ditch	---	06/20/1885	Box Elder Spring
Irrigation	CR CC05/045	---	McCrossin Ditch No. 2	0.03	08/30/1898	Saw Mill Canon Spring
Irrigation	CR CC05/046	---	McCrossin Ditch No. 1	0.16	08/30/1898	Saw Mill Canon Spring
Irrigation	CR CC05/052	---	Dell No. 1 Ditch	0.1	10/25/1897	Spring Canon Creek
Irrigation	CR CC21/134	---	South Spring Creek Ditch	0.64	6/2/1906	South Spring Creek
Irrigation; Stock	CR CC27/152	---	Werner Home Ditch	0.04	05/31/1893	Spring (8-33-72)
Stock	CR CC27/155	---	Pipeline	0	07/08/1898	Williams Springs

Use	Permit Number	Designation	Name	Appropriation (CFS/GPM)	Priority Date	Stream Source
Municipal	CR CC32/102	---	Enl. Little Box Elder Ditch Co. No. 4 Ditch as changed to Douglas Pipeline	0.87	06/20/1885	Box Elder Spring
Municipal	CR CC34/254	---	Enl. Little Box Elder Ditch Co. No. 4 Ditch as changed to Douglas Pipeline	0.08	4/20/1910	Box Elder Spring
Municipal	CR CC34/255	---	Enl. Little Box Elder Ditch Co. No. 4 Ditch as changed to Douglas Pipeline	0.12	4/20/1910	Box Elder Spring
Irrigation	CR CC42/068	---	No. 3 Ditch	0.09	6/14/1918	Spring
Domestic	CR CC42/694	---	Schmeidlein Pipeline	0.1	8/1/1922	Spring
Stock	CR CC44/264	---	Harvey Spring Ditch	0.01	7/20/1923	Harvey Spring
---	CR CC45/013	---	Bishop Spring Ditch	---	11/20/1922	Bishop Spring
Municipal	CR CC45/283	---	Douglas Pipeline No. 1	---	8/20/1923	Little Box Elder Spring
Irrigation; Stock	CR CC46/178	---	Clement No. 2 Ditch	0.77	9/9/1916	Spring Canon Creek
Domestic; Irrigation	CR CC46/179	---	Clement No. 3 Ditch	0.3	1/5/1921	Spring Canon Creek
Stock and Domestic	CR CC46/422	---	Hart Water Systems	0.03	12/10/1928	Hart Spring
Stock and Domestic	CR CC65/265	---	Carothers Spring Ditch	0.784	10/12/1939	Carothers Spring
Recreational	CR CC65/346	---	Warm Springs Swimming Pool Pipeline	1	1/29/1954	Warm Springs

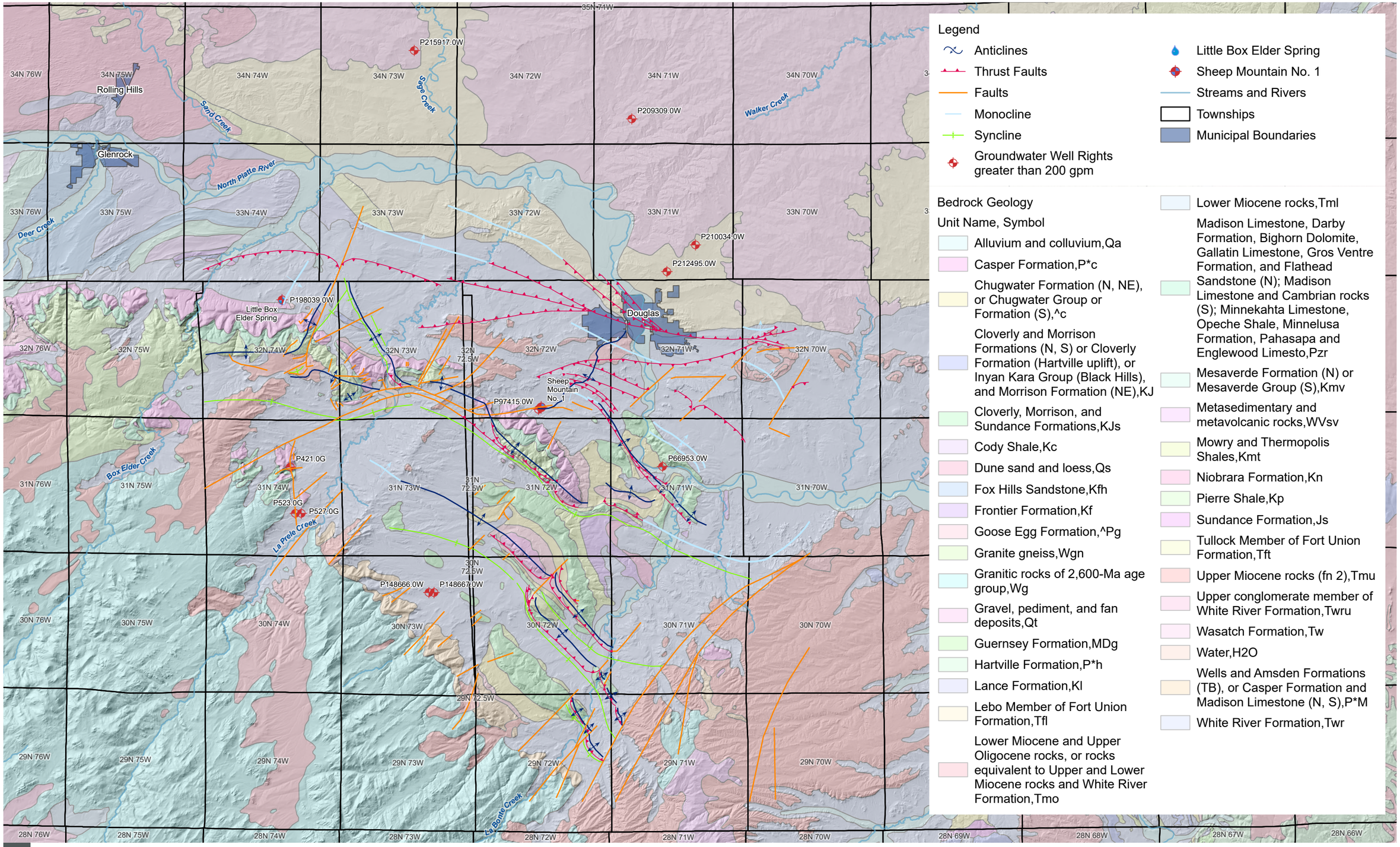
Use	Permit Number	Designation	Name	Appropriation (CFS/GPM)	Priority Date	Stream Source
Domestic	CR CC72/008	---	Sportsman Spring Pipeline	0.056	5/22/1972	Sportsman Spring
Domestic; Irrigation	CR CC84/142	---	Enl. Warm Spring Swimming Pool Pipeline ACIPT, APCT, and ACT Multiple Facilities	0.36	1/19/1960	North Platte River
Compiled from Wyoming SEO Records (State of Wyoming Engineer's Office, 2025b)						

These data compiled from SEO records were partially included in Weston (2015) and Garland (1996). Table 24 only includes wells that have a groundwater right greater than 200 GPM. Several of the wells with an incomplete water right status have not been drilled. The seeps identified by Garland (1996) are also shown on Figure 23 but are typically small and do not have a water right associated with the spring. The total flow from all the springs reported in Table 25 is about 125 cfs.

6.5.2 Potential for Water Source in the Paleozoic Aquifer System

The geology and hydrogeology of the Paleozoic aquifer system have been discussed in detail by previous investigators and are summarized below. Assuming a non-hydrologic determination can be made, the geologic targets presented in these reports provide an excellent new water source for the City of Douglas.

In brief, the Late Paleozoic aquifer system consists of the Casper/Tensleep Aquifer that is composed of fine- to medium-grained sandstone beds and impermeable shale beds that are interbedded with finely crystalline, dense limestone and dolomite (Madison Limestone). According to Morgan and Garland, vertical fractures within limestone and dolomite interbeds commonly create zones of secondary permeability in this aquifer (Garland, 1996). Most high-producing wells and springs occur along these fracture-enhanced zones of permeability as shown in Figure 23.



GEOLOGIC MAP

\\SXF-SRV01\ENGIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_103996421\7.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 5/20/2025

DOUGLAS, WY

Figure 23. Geologic Formation Map

In contrast, limestone beds yield very little water in areas where they are not fractured. Wells and springs located in the Casper/Tensleep Aquifer produce between 1 and 4,000 GPM while aquifer transmissivities range between 140 and 11,000,000 gallons per day per foot (GPD/foot) (Richter & Huntoon, 1982). The Sheep Mountain No. 1 was aquifer tested in July 1990 at a rate of 1,001 GPM for 182 hours. The maximum drawdown of 21.8 feet occurred 30 seconds after the test was started and remained at that level for the duration of the test (TriHydro, 1990). The specific capacity of the well at that time was 47.2 GPM/ft of drawdown. Evaluation of the pump test data determined that the aquifer's effective transmissivity was 574,611 GPD/foot (76,820 ft^2/day) and the hydraulic conductivity was 1,715 GPD/foot (230 ft^2/day).

The predicted groundwater quality within the La Bonte Groundwater Compartment, a structural compartment associated with the Sheep Mountain Well, is good. Two structural sites within the La Bonte Compartment, Crooked Stick Anticline and Sage Hen Anticline, were not addressed by DOWL-HKM (2010) since the groundwater quality was unknown. DOWL-HKM recommended additional investigations using existing wells as monitoring wells near the potential well sites identified by the Douglas Master Plan Site Study (see Table 3.4 in the DOWL-HKM Level 1 Report). They also recommended installing flumes and measuring devices at perennial streams (La Prele Creek), several unnamed springs, and the Douglas Warm Springs as well as installing several weather stations near the springs and potential well sites (Dowl HKM, 2010). HDR's subconsultant CDLidstone recommends installing monitoring equipment at the prospect sites as the data would be useful for evaluating and determining the La Bonte Groundwater Compartment and its non-hydrologic connection to the NPR.

6.5.3 Paleozoic Aquifer System Water Wells and Springs

All the well siting efforts by the City of Douglas have focused on the Paleozoic aquifer system because wells installed in the Madison and Casper Formations have much greater potential for a municipal supply well compared to other aquifers systems near Douglas. The groundwater from the Box Elder Spring and Sheep Mountain Well No. 1 are both sourced from the Paleozoic Aquifer.

6.6 Potential for a Water Source in the Quaternary, Tertiary, and Late Cretaceous Aquifer Systems

As previously mentioned in Section 1.3 of this report, TriHydro identified groundwater prospects within the Platte River Basin Plan (TriHydro Corporation & Lidstone and Associates, Inc, 2007). These groundwater prospects were considered potential groundwater sources that could provide water supplies within the North Platte River Basin. Select sites in the Douglas (Converse County) area included the

Tertiary Age Fort Union Formation and the Scoria Aquifer. The following sections draw from information in the Platte River Basin Plan and, for the purposes of this report, supplement the extensive information and data base that has focused on the Paleozoic aquifer system outside of the Green Zone. The Green Zone is shown in Figure 9 and represents well drilling opportunities that are considered non-tributary to the NPR. The Green Zone is located on the southern structural margin of the Powder River Basin. Any well completed into the Paleozoic aquifer system within the Green Zone is likely considered “non-tributary”. However, such a well would be very deep (e.g., greater than 5,000 feet), and the water quality is likely poor (e.g., containing high-salinity waters).

6.6.1 Quaternary Aquifer System – Alluvial Deposits

Groundwater resources hosted within the Quaternary aquifer system, alluvial deposits, are present within the study area. The alluvial deposits are found along the NPR and its tributaries, including La Prele Creek, Box Elder Creek, Sage Creek, Sand Creek, Wagon Hound Creek, and La Bonte Creek. These deposits are “hydrologically connected" to the NPR system.

6.6.2 Quaternary Aquifer System – Terrace Deposits

Groundwater resources present in the Quaternary aquifer system also include the terrace deposits, which reflect older alluvial deposits. Some of these older alluvial deposits may not be directly connected to the river, but there is likely some degree of connectivity. Investigation of these aquifers must determine the degree of “hydrologic connection” to the NPR system. These deposits are commonly unconsolidated deposits and unconformably overlie older bedrock formations; they consist of eolian, glacial, lacustrine, and terrace deposits.

Available analyses of waters from such terrace deposits (non-alluvial Quaternary aquifers) show a total dissolved solids (TDS) concentration range of 106 to 9,300 mg/L. Cation composition ranges from calcium to sodium and anion composition ranges from bicarbonate to sulfate. The higher TDS sources will not meet municipal standards.

Groundwater flow through these unconsolidated deposits is predominantly intergranular, occurring within permeable zones. Where sufficiently saturated, the terrace deposits will yield moderate to large quantities of water to wells. The Quaternary terrace deposits (Qa) are shown on the geologic map presented in Figure 23. Table 24 lists several wells that were drilled in such deposits within the La Bonte Groundwater Compartment. These shallow wells are directly connected to surface water.

6.6.3 Middle Tertiary Aquifer System

The Middle Tertiary aquifer system is present within the project area and is extensively used within southeastern Wyoming from Laramie County in the south to Niobrara County in the north. It includes the Oligocene and Miocene age formations and is grouped as the High Plains Aquifer. Although the younger rock is generally not present in Converse County, the High Plains Aquifer includes, from youngest to oldest, the Ogallala Formation (To), Arikaree Formation (Ta), and Wind River Group (Twr). These units are shown on the geologic map presented in Figure 23. The permeable sandstone, conglomeratic sandstone, and conglomerate beds present in the Middle Tertiary formations are excellent aquifers where they are sufficiently saturated with water. Groundwater flow occurs predominantly as intergranular flow through permeable zones in these lithologies.

Limited water quality data is available for the Middle Tertiary White River and Arikaree Aquifers in the southeastern part of the Powder River Basin. Typically, water from these aquifers contains less than 1,000 mg/L TDS and is sodium bicarbonate in character. One well approximately 12 miles west (T33N, R73W, Sec. 27) of Douglas has sodium sulfate-dominated waters with about 4,300 mg/L TDS. The Late Tertiary aquifer system deposits will yield small quantities of water to wells but would not be a viable source of groundwater for the City of Douglas.

6.6.4 Early Tertiary Aquifer System

The Early Tertiary aquifer system in the project area includes the Wasatch Formation and Fort Union Formation. This aquifer system is located within the Green Zone and is considered non-tributary. These units are shown on the geologic map presented in Figure 23. The Early Tertiary aquifer system occurs within and along the margins of most of the structural basins (including the Powder River Basin), which formed during the Laramide Orogeny and consists of up to 3,000 or more feet of highly-variable, lenticular, fine-grained sandstones, shales, claystones, and coals. High lithologic variability prevents identifying any extensive water-bearing zone. Most of the coals and sandstones can produce water if saturated but yields and quality vary greatly (Feathers et al., 1980). The more productive groundwater system includes water derived from sandstone, conglomeratic sandstone, and conglomerate beds within the Wasatch and Fort Union. Small to large quantities of water can be sourced from these Early Tertiary (Eocene and Paleocene) aquifers.

Most existing wells are private, low-yielding domestic and stock wells. In the Gillette area, over 90 percent of the Wasatch wells are less than 300 feet deep and are relatively low yielding. In the southern margin near Douglas, the depths of the existing Wasatch wells are also shallow and similarly of limited production. Data suggests that yield increases with well depth as more water-bearing sands are penetrated and screened. The lower aquifer system boundary has not been explored and may arguably be associated with the Lebo Shale of the Fort Union. Underlying

the Lebo is the Tullock Member of the Fort Union, which is a high-quality potable water source of limited yield.

The Wasatch and Fort Union Formation coal seams serve as a local aquifer for numerous livestock wells within the Powder River Basin. Where the coal has outcropped along the eastern margins of the Basin, the coal has caught fire and formed into a very porous material known as scoria or clinker. This clinker or scoria system tends to recharge the underlying aquifers. Aquifer test data suggests not only high yields but also tremendous storage. Where the clinker abuts the coal mines, various mining companies maintain a leave strip of unmined coal to prevent problems with mine dewatering and slope instability caused by the release of water from the scoria or clinker aquifer. Although the clinker or scoria aquifer is an unexplored groundwater source, its distance from Douglas will affect its viability as a developable water source. The southern outcrop of significant scoria is approximately 50 miles north of Douglas.

Yields over 250 GPM may be obtained from wells penetrating thick, saturated sandstones; locally-occurring coarse sand lenses; zones of high secondary fracture permeability; areas hydrologically connected with surface waters; or areas adjacent to ”scoria” recharge zones. None of the highly productive saturated deposits are near the City of Douglas. Typical yields of Wasatch and Fort Union wells in the vicinity of Douglas are less than 20 GPM.

6.6.5 Late Cretaceous Aquifer System

The Wasatch/Fort Union Aquifer is available over a large portion of the central Powder River Basin, and extensive chemical data exists on its groundwater quality. The discontinuous, lenticular nature of the water-bearing sandstones comprising the system results in significant water quality differences over short geographic distances. However, several generalizations can be made with respect to the overall chemical character of Wasatch/Fort Union groundwater.

Dissolved solids content varies from less than 230 mg/L to over 6,500 mg/L. Generally, there is little correlation between TDS and well depth, although a decrease in dissolved solids with increasing depth has been suggested for some parts of the aquifer (Davis & Dewiest, 1966; Whitcomb et al., 1966). An apparent though unsystematic geographic zonation of dissolved solids content is present. An area of relatively diluted (less than 1,000 mg/L TDS) water runs northwest-southwest through the east-central part of the Basin, while wells in several sporadically-located zones produce waters containing greater than 3,000 mg/L dissolved solids.

Wasatch/Fort Union waters from relatively shallow wells have a widely variable major ion composition. Most analyses show that waters with either mixed cation content or

sodium enrichment containing less than 300 mg/L dissolved solids are enriched in bicarbonate, while more saline waters are characteristically high in dissolved sulfate.

Major ion composition has a relationship to well depth; the increase in sodium has been attributed to cation exchange of sodium for dissolved calcium and magnesium. The presence of hydrogen sulfide in some Wasatch/Fort Union groundwater implies that bacterial reduction of sulfate results in the observed change in anion composition (Lowry & Christiansen, 1966; Whitcomb et al., 1966). It is probable that these variations result from horizontal flow within hydrologically-isolated sand bodies, and that depth is an indicator of relative distance from outcrop recharge zones rather than a large component of vertical downward flow through the system.

Wells penetrating coal seams or other carbonaceous deposits often yield both water and gas. The discharged gas is mainly methane and is associated with smaller quantities of nitrogen and oxygen. Methane gas was detected in Western Sky 1 well (U.W 210034.0) located near the City of Douglas. Specifics of this well are further discussed later in this section. In Converse County, wells are often completed in the Fort Union Formation, which contains interbedded coal and sandstones.

6.6.6 Groundwater Modeling of an Early Tertiary/Upper Cretaceous Aquifer Well Field

The Late Cretaceous aquifer system is present with surface exposures in Goshen Hole, the southwestern flank of the Black Hills Uplift, Casper Arch, Laramie, Hanna, Carbon, and Shirley Basins. This aquifer system, which includes the Fox Hills/Lance—or in the local area, the Fox Hills/Lower Hells Creek Aquifer (collectively the Fox Hills)—is within the Green Zone but is only present at depths greater than 3,500 feet. The sandstone and conglomeratic sandstone beds of the Fox Hills are reported to yield small to large quantities of water to wells, where sufficiently saturated.

Most hydrologic data for the Fox Hills aquifer system are shallow wells near the outcrop zone. Because these are commonly low-yield stock wells, extensive aquifer testing has not been conducted. If aquifer test data is reported, it generally reflects the results of a single yield/drawdown test result (Feathers et al., 1980). Available but limited data indicates moderate to good potential for the development of relatively low-yield wells in the Douglas area. Large-drawdown high-capacity industrial wells, which are perforated for the entire stratigraphic interval, have yields up to 380 GPM in northern Converse and Campbell Counties. The specific capacity of Fox Hills/Lance Aquifer wells average 0.6 GPM/ft of drawdown. Values generally range from 2 to less than 0.1 GPM/ft, but two anomalously high values of 5 and 60 GPM/ft were identified.

In summary, the Fox Hills aquifer system near Douglas is deep, virtually unexplored. Lichtner developed structural and thickness maps of the Upper Cretaceous strata in

the Powder River Basin and reported that the elevation of the top of the Fox Hill Sandstone near Douglas may range from 2,000 to -1,000 feet mean sea level (Lichter et al., 2020). The combined thickness of the Fox Hills/Lower Hells Creek may range up to 1,000 feet, with the Fox Hills portion roughly 200 to 300 feet thick. Above the aquifer is the Upper Hells Creek Aquitard and below is the Cretaceous Pierre/Lewis Shale. Figure 22 shows a well (P215917.0W) located in the SW¼ of Section 11, Township 34 North, Range 73 West. A review of the SEO records (UW5) indicates that this well was never drilled; the target water production zone was the Fox Hills Sandstone at a depth of 4,000 feet. Continental Resources Inc. drilled a well in S22 , T 33N , R 71W in 2008. This well was drilled about one mile northeast if the Converse County Airport. The total depth of the well was 8,540 feet bgs, and the completion report indicated that the top of the Fox Hills formation was encountered at 5,924 feet bgs.

6.6.7 Characteristics of a Completed High Capacity Early Tertiary/Upper Cretaceous Well

The hydrologic properties of the Early Tertiary/Upper Cretaceous aquifer system have been addressed in relation to energy resource development within Converse County and portions of the Powder River Basin by an Operators Group (OG) consisting of Anadarko Petroleum Company, Chesapeake Energy Corporation, Devon Energy, EOG Resources, Inc., and SM Energy.

The Operators Group prepared an Environmental Impact Statement (EIS) for a 5,000 well project that would consume an estimated 7,000 acre-feet per year of groundwater over a 10-year period. The water would be used for drilling, completions (including hydraulic fracturing), and dust control, and the project would occur in an area of historic and ongoing oil and gas development.

Appendix E of the EIS includes a numerical groundwater model that was conducted for the portion of the Powder River Basin located within the project area that includes approximately 1.5 million acres located within Converse County, Wyoming (Operators Group, 2014). Although the model was later determined by the District Court to underestimate the impact of the project (*Powder River Basin Resource Council, et. Al. Plaintiffs vs. U.S. Dept. Of Interior, et al. Defendants*, 2014), it provides a good evaluation of groundwater opportunities within the Early Tertiary and Upper Cretaceous system. The modelled shallow aquifer system included those aquifers and confining units located stratigraphically above the Cretaceous Pierre/Lewis Shale. Lithostratigraphic units contained within this system include, in descending order, the Quaternary terrace deposits and alluvium deposits, the Early Tertiary Wasatch and Fort Union Formations (including the Tongue River, Lebo, and Tullock Members), and the Upper Cretaceous Hell Creek Formation and Fox Hills Sandstone.

The three modeled scenarios included:

- No Action Alternative: Water from existing water sources within the roughly 1.5-million-acre Converse County project area could be used at the estimated consumption rate of approximately 1,441 acre-feet per year (171,972 cubic feet per day) for 15 years. The water sources are listed in Appendix B of the water resources white paper provided by the Operator Group (Operators Group, 2014).
- Proposed Action Alternative, Concentrated Pumping Scenario: Water would be used at the estimated consumption rate of approximately 7,000 acre-feet per year (835,394 cubic feet per day) for 10 years from new water supply wells concentrated at locations within the CCPA.
- Proposed Action Alternative, Dispersed Pumping Scenario: An additional 50 water wells would be drilled, with an assumed annual consumption rate of 7,000 acre-feet per year (835,394 cubic feet per day) for 10 years, dispersed evenly throughout the CCPA.

For their modelling efforts the Operators Group assigned hydraulic conductivity to the five hydrogeologic units as summarized in Table 26.

Table 26. Hydraulic Conductivities used in the Operating Group (OG) Modelling Efforts

Model Layer	Hydrogeologic Unit	Hydraulic Conductivity (ft/day)					
		Horizontal			Vertical		
		Range	Mean	Standard Deviation	Range	Mean	Standard Deviation
1	Wasatch/Tongue River Aquifer	0.50 - 4.97	1.72	1.44	0.05 - 0.50	0.17	0.14
2	Lebo Confining Unit	0.20 - 1.97	0.72	0.53	0.02 - 0.20	0.07	0.05
3	Tullock Aquifer	0.40 - 1.96	0.79	0.35	0.04 - 0.20	0.08	0.04
4	Upper Hell Creek Confining Unit	0.20 - 1.98	0.55	0.31	0.02 - 0.20	0.06	0.03
5	Fox Hills/Lower Hell Creek Aquifer	0.30 - 1.97	0.72	0.36	0.03 - 0.20	0.07	0.04
NA	Pierre/Lewis Shale Basal Confining Unit1		0.05			0.0000023	

Based on borehole core samples from Williston Basin (Thamke et al., 2014). Pierre/Lewis Basal Confining Unit is not explicitly included in the model but constitutes the base of the model.

Adapted from (Operators Group, 2014)

The Operators Group used 0.15 for the specific yield and 0.001 for the specific storage for all five hydrogeologic units. Each water well would be limited to 100 GPM based on the average pumping rate for each well (Operators Group, 2014). According to the Operators Group, 100 GPM can be sustained by water supply wells for a 10-year period. Under the proposed action, up to 50 new groundwater wells would be drilled to cover the annual anticipated needs of the project.

The modeling exercise concluded that equally distributing 50 water wells across the Wasatch/Tongue River Aquifer would lead to isolated and localized cones of depression centered on each pumping well, even when pumping at 100 GPM. Drawdown reached a maximum of approximately 40 feet for some wells and would reach a maximum of approximately 100 feet in one well where the hydraulic conductivity was the lowest at 0.5 feet/day.

Drawdown extended to approximately 3,500 feet around many wells as defined by the 1-foot drawdown contour. Approximately 35,000 acres would be within an area impacted by at least one foot of drawdown. The 10-foot drawdown contour would be limited to approximately 1,000 feet from each of the pumping wells. Drawdown reached a maximum of 22 feet after 10 years of pumping and then returned to pre-pumping levels after 20 years of recovery. A drawdown of 10 feet or greater did not extend to any of the existing water wells in Converse County. To prevent a drawdown of 10 feet or greater reaching any existing water wells, any proposed new water well would need to be located at least 2,000 feet or greater from an existing well.

The OG computer simulation is relevant to the City of Douglas' opportunity to develop an Early Tertiary aquifer well field within the Green Zone. To achieve a 1,000-GPM design flow, the City would need to construct 10 wells at one-half mile spacing and pump each well at 100 GPM to meet supplementary water supply demands. Even with the low rate of flow and expanded spacing, one can anticipate aquifer impacts.

6.6.8 Characteristics of a Completed High-Capacity Early Tertiary/Upper Cretaceous Well: Western Sky 1 (U.W.210034.0)

Figure 22 provides an example of one such well (P210034.OW) located in the SW¼ of Section 26, Township 33 North, Range 71 West. A review of the SEO Statement of Completion (UW6) indicates that this well (Western Sky 1) was drilled and completed in 2018 to a depth of 2,646 feet. Its target was the lower Fort Union Formation (Tullock Member). The principal water bearing zone was encountered from 653 to 2,646 feet. The well log shows that the borehole extended from 2,646 to 2,816 feet where claystone, mudstone, and coal were encountered (Lance Formation). The well is owned by Western Cable LLC (Western Cable) and its water is appropriated for oil and gas drilling. The 75-horsepower pump was set at 1,070 feet and produces 300

GPM according to the UW6 form. The well is in the Green Zone and is located about 13,100 feet northeast of the Douglas city limits. A copy of the UW6 form and well log is provided in Appendix E- Hydrogeology Supplements**.**

In a letter dated January 21, 2025, Forsgren Associates, Inc. prepared an analysis of Western Sky 1 well to the City of Douglas. The letter followed a proposal from Western Cable to sell the well to Douglas for $1,550,000, plus continued use of water from the well at a cost of one-half of the normal bulk rate (B. Jordan, personal communication, 2025). The letter (included in Appendix E- Hydrogeology Supplements) discussed the following items:

- The history of the Western Sky 1 well permitting, including the current priority date (October 12, 2018), the permitted pumping rate (300 GPM), and annual production volume (245 acre-feet) limitation.
- Well construction details and pump installation.
- Water production rates from the well, including a table showing the production rates from 2018 to 2023 (see Table 2 in Appendix E- Hydrogeology Supplements).
- Well testing that included the procedures and results of step-rate testing that began on August 7, 2024, a long-term test that was conducted from December 3 to 5, 2024, and the results of the aquifer testing.
- Water quality results for samples collected from August 22, 2023, June 18, 2024, August 7, 2024, and December 4, 2024 (see Table 4 in Appendix E- Hydrogeology Supplements).
- Issues relating to the need for water treatment from Western Sky 1 and associated costs to the City of Douglas.
- The potential to drill a second well on land owned by Western Cable.
- An estimate of the costs to install a well similar to Western Sky 1, provided by Western Mountain Operating, the drilling company currently drilling Sheep Mountain No 2.

The Western Sky 1 well was completed as a 5.5inch, 0.010 slot stainless steel well screen across 14 permeable zones ranging in depth from 1,372 to 2,646 feet. Although efforts were made to avoid screening across the coal zones, these zones were not sealed and likely commingle with the waters derived from the non-coal production intervals.

During well development, the well had a lower-than-desired production rate after 48 hours of air lift development. The lower screened (1,372-2,646 feet) Fort Union Formation only produced about 30 GPM. Based on their site geologist's recommendation, it was decided to perforate the existing 10.75-inch casing to include a thick, sandier zone from 546 to 974 feet.

Forsgren completed an aquifer test of the Western Sky 1 well from December 3 to 5, 2024. The constant rate test began at 345 GPM, and after 58.3 hours, the pumping rate had declined to 239 GPM. Based on the aquifer test analysis, the aquifer transmissivity was determined to be 650 GPD/foot or 86 foot^2/day with a hydraulic conductivity of 0.2 feet per day.

The groundwater quality sample conducted for the Western Sky 1 can be found in Table 4 in Appendix E-Hydrogeology Supplements. Overall, the water quality is not very suitable for municipal use, with TDS concentration of 448 mg/L. The ammonia concentrations for the well water were 1.56, 1.20, and 1.05 mg/L for the three samples that were collected in 2024. The source of the ammonia was believed to be from the decomposition of methane gas. The well water sample from August 7, 2024 contained a dissolved methane concentration of 8.9 mg/L, and gas bubbles were visible in the discharge water. Iron was also present in the well water during three of the sampling events, ranging from 0.41 to 0.48 mg/L.

It was reported that disinfecting of water from the Western Sky 1 well for potable water use with chlorine or chloramines would result in significant concentrations of disinfection by-products, which the EPA regulates as carcinogens. These by-products form from the interaction of chlorine, methane and ammonia. Treatment for iron in the Western Sky 1 well water would be necessary to reduce staining of plumbing fixtures and other surfaces that come into contact with the water as well as to control odor.

The estimated costs to install a well similar to Western Sky 1 was $1,457,277 (B. Jordan, personal communication, 2025). Forsgren Associates also estimated that the current value of the 12-year-old Western Sky 1 well would be $1,020,355. CEPI prepared an earlier cost estimate in June 2023, which included chlorination of the well and its connection to the Douglas water distribution system. The cost estimate included a small water storage tank, controls building, pressure control building, and SCADA upgrades that totaled $4,347,000. Full water treatment costs (for iron and disinfection by products) for the 200-GPM production well were estimated at approximately $1.0 to $1.5 million. The total costs to bring this well online would likely approach $5.5 million, in addition to the cost of the well. An evaluation by HDR determined that the previous treatment costs were likely low due to the high concentration of ammonia. A full treatment facility, with more complex processes to

address the constituents in the produced water stream, would likely need to be installed on-site. The cost of this treatment train could exceed $2.5 million.

6.7 Summary and Evaluation of Potential Groundwater Sources

The potential groundwater and/or augmentation sources near the City of Douglas are limited. Even if the PRRIP restrictions were not in place and the Paleozoic Aquifer could be utilized as an independent water source, none of the favorable areas detailed in Table 27 are near an existing water transmission line.

Table 27. Potential Well Site Summary from 2010 Douglas Master Plan Level I Study

Site Name	Location (Township Range Section)	Groundwater Compartment	Predicted Water Quality	Est. Depth to Top of Paleozoic Aquifer (feet)	Est. Depth of Well (feet)	Est. Static Water Level (feet)	Land Ownership	Interference Potential (Wells and Springs)	Access	Estimated Pipeline Length (feet)
Cottonwood Creek Anticline Site	T32N R74N SW SEC 1	Boxelder	Good	125	1,250	25	Green Valley Corp.	High Little Box Elder Spring	Good Long	7,000[1]
Natural Bridge Anticline Site	T32N R73W SW SEC 16	La Prele	Good	1,325	2,425	<25	State of Wyoming	High Natural Bridge Spring	Good	23,000[1]
Table Mountain Fault Zone Site	T32N R73W CENTER SEC 23	La Bonte	Good	125	1,400	25	Richard Cross	Low	Moderate Long	29,000[1]
Sheep Mountain Anticline Site 1 (a.k.a Sheep Mountain No. 2)[4]	T32N R72W NW ¼ SE ¼ SEC 33	La Bonte	Good	150	1,100	300	Bedtick Ranch	High Sheep Mountain Well and Springs	GOOD	1,300[2]
Sheep Mountain Anticline Site 2	T31N R72W SE ¼ SEC 3	La Bonte	Good	375	1,350	300	Bed Tick Ranch	Moderate Sheep Mountai	Moderate Long	6,100[2]

Site Name	Location (Township Range Section)	Groundwater Compartment	Predicted Water Quality	Est. Depth to Top of Paleozoic Aquifer (feet)	Est. Depth of Well (feet)	Est. Static Water Level (feet)	Land Ownership	Interference Potential (Wells and Springs)	Access	Estimated Pipeline Length (feet)
								n Springs		
Crooked Stick Anticline Site	T31N R71W NW ¼ NW ¼ SEC 20	La Bonte	Unknown	275	1,225	75	Fitzhugh Living Trust	Low	Good Short	42,000 [3]
Sage Hen Anticline Site	T31N R72W CENTER SEC 30	La Bonte	Unknown	300	1,350	125	Garrett Falken-Burg	Low	Good Long	76,000 [3]

1 Assumes tie-in on replacement LBES Line 1

2 Assumes tie-in at Sheep Mountain Tank 2

3 Assumes new, dedicated transmission line

4 Drilled and abandoned 2025

Adapted from Dowl HKM Master Plan (Dowl HKM, 2010)

Water from a well near the LBES could be incorporated into an existing transmission line in an additive or a redundant manner. The Weston 2008 WWDC Level 2 report is the source of information and for the record, provides mixed information. Weston found that there were some variability in water quality (slight but distinct) and temperature between the water flow from the test boring well and the water flow from the Spring. Following the completion of the test boring (2002), MWH pump tested the well at a flow rate of 500 gpm for 58 hours and noted that after 26 hours there was a one (1) inch decrease in flow at the Spring (SEE 2008 REPORT ATTACHMENT (PAGE III-6)). The actual log of the test (Appendix C, also attached to this email page 123) does not even indicate a one (I) inch change. Interestingly the Weston conclusions were that the well and the spring are interconnected and common sense may suggest that this is the case. The collected data from the test does not appear to support this conclusion is worth further investigation. The Spring (based on water quality) appears to heavily influenced by the Casper/Madison and it is possible that the lower units (Lower Ordovician and Cambrian), which are perforated in the LBES Well No. 1 are isolated or partially isolated from the Spring. Although geologically there appears to be a continuous Paleozoic Aquifer, this Team's experience is that the lower Madison is often "fracture poor" and this several hundred foot unfractured unit can isolate the BigHorn Dolomite from the water-bearing upper Madison. The Big Horn and the Gallatin are both aquifers and can provide non-LBES water to the well (LBES Well No.1) with minimal interference to the Spring. The basis for this recommendation is the availability of pipeline capacity and the discussion of local recharge within the Weston 2008 report as presented on Tables II-2 and II-3 . Recharge within the Paleozoic Aquifer compartment appears to be adequate for additional use by the City, but Douglas should maintain a monitoring program to ensure that they are not "mining" the Paleozoic Aquifer.

Besides the Paleozoic Aquifer, multiple other aquifers can be explored but are limited by yield, cost (due to transmission line distance) and/or quality. The Quaternary Aquifer may provide adequate volume and quality, but such wells are likely tributary to the NPR. The Scoria Aquifer will likely meet quality and quantity but requires significant transmission line distance. Purchase of water from the Highland Mine Pit would augment the NPR, but conveyance loss and/or pipeline distance needs to be considered.

The other remaining alternatives include well completions within the Green Zone. These alternatives include a well field completed in the Early Tertiary aquifer system, specifically the Wasatch or Fort Union Aquifers, and a deep well into the Cretaceous Fox Hills Aquifer. Consideration for the Tertiary Aquifer alternative must address: (1) the anticipated lower well yields; (2) variable water quality; (3) well field spacing and (4) transmission line costs. Well completion into the Late Cretaceous aquifer system (Fox Hills/Lower Hells Creek) must consider the lack of specific data within the

Douglas area. Successful completion into this zone is limited by the depth to the target and potential yield of the individual well. The well depth may range up to approximately 6,000 feet with an estimated well yield of less than 300 GPM. Very little water quality data for the Fox Hills in this area is available to assess its suitability as a municipal supply source. Successful municipal well completions into the Lance/Fox Hills completions have occurred in southeast Wyoming (Pine Bluffs, Laramie County). These wells are suitable for municipal use and are blended with other sources.

Table 28 presents a summary of potential groundwater sources for the City of Douglas and ranks the alternatives. The table also presents potential augmentation options that could be considered.

Table 28. Summary of Potential Groundwater Sources

Alternative	Type	Cost	Water Quality	Rank	Access
Scoria Deposits	Augmentation	$$$	Good	3	Fair
Highland Pit Water	Augmentation	$$$$	Poor	4	Poor
Fox Hills Well	Water Source	$$$$	Fair	2	Good
Fort Union Well	Water Source	$$$$	Fair	1	Good

The recommendations from this section are as follows:

1. Install monitoring equipment to monitor the SMW and LBES aquifers.
2. Discuss the connectivity of SMW with the SEO.
3. Implement a secondary source near LBES (potentially LBEW No.1).
4. Drill an exploratory hole in the Tullock member of the Fort Union Formation.
5. Drill an exploratory hole in the Fox Hills/High Plains Aquifer.

7.0 Inventory and Evaluation of the City of Douglas Water System

7.1 Transmission Mains

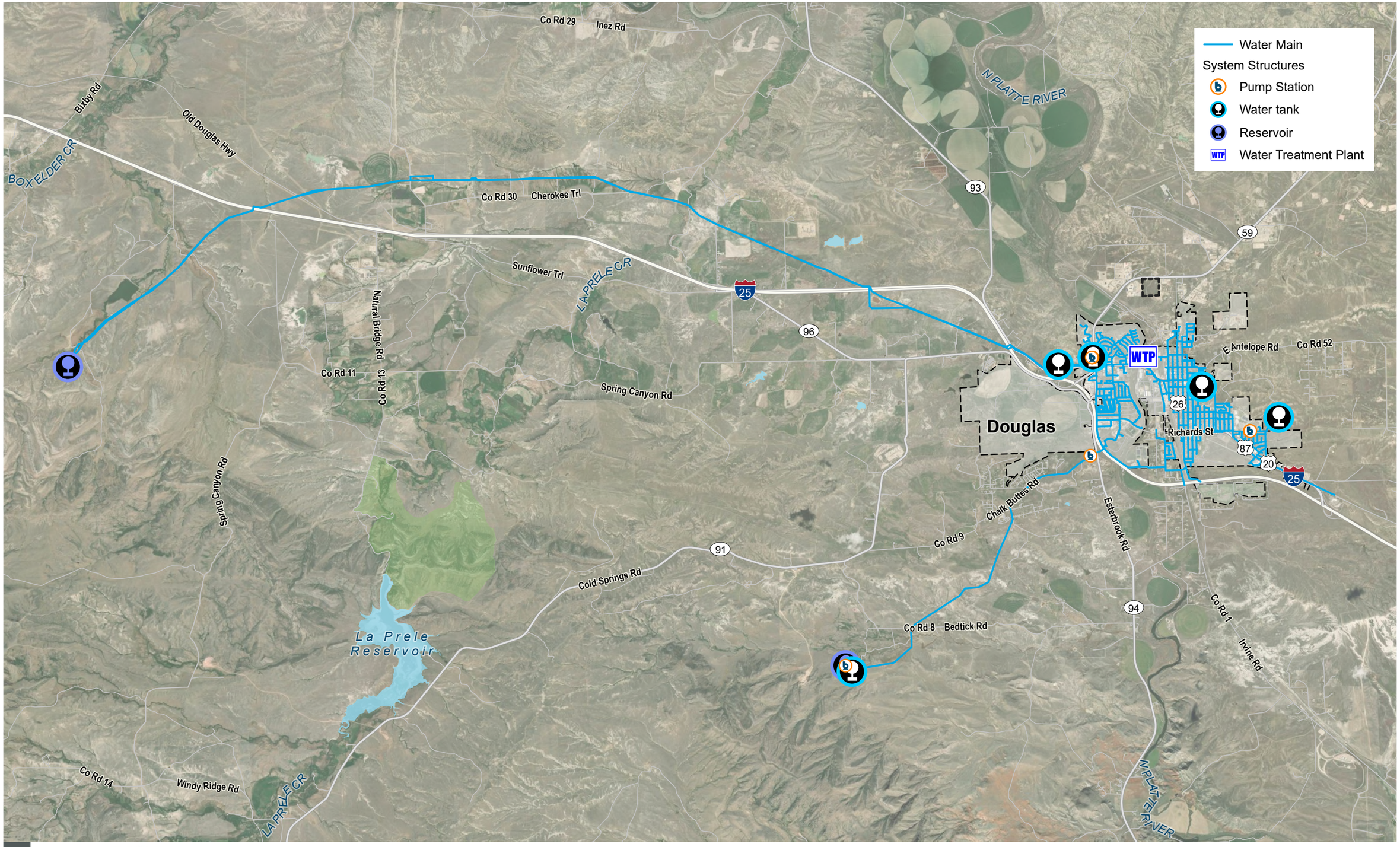
7.1.1 Little Box Elder Spring Line

The original Springline was a wooden pipeline that ran from the spring to the City of Douglas. This was eventually replaced with a cement line, with the wooden line abandoned in place. The newest line, completed in 2020, is a 16-inch PVC line approximately 3.6 miles long before it is encased in a carrier pipe to be transported under I-25. The carrier pipe is then terminated, and the 12-inch line continues for 12.5 miles before reaching the Orpha tank. This line is chlorinated twice before reaching the Orpha tank—once near the spring site (Barber control) and once at the Inez control building. This line is the main source of supply for the City year-round , providing 100% of the water from October to April and between 50-90% from June to September. The two preceding lines have been abandoned in place as historical structures.

7.1.2 Sheep Mountain Well Transmission Line

The transmission line for SMW was built after the completion of SMW No. 1. The line from the well to the storage tank is an 8-inch PVC line, approximately 600 feet long. From the storage tank, a 12-inch PVC line extends about 5.3 miles to the southwest edge of the City. This line is chlorinated on-site at the control building before being transmitted to the City. To match existing distribution pressures, a pressure-reducing valve at the Chalke Buttes booster station reduces pressure from the line to existing distribution pressures. The line is primarily used in the spring and summer months as a supplement to the Little Box Elder supply, while also serving Ridgewater Estates year-round.

Figure 24 is a map for transmission mains for SMW and LBES, as well as the distribution system.



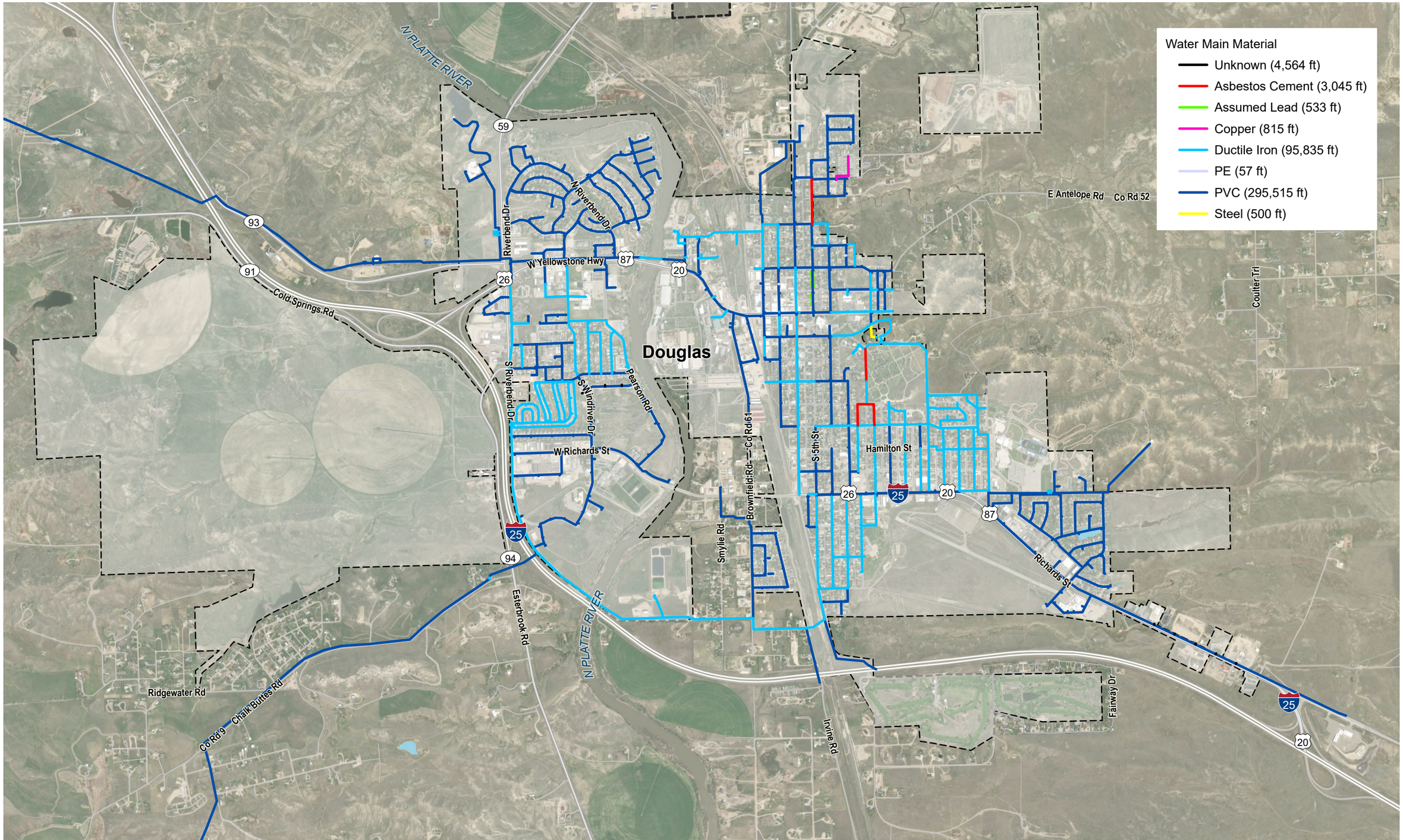
DOUGLAS WATER SYSTEM

\\SXF-SRV01\ENGIS\PROJECTS\CITY_OF_DOUGLAS\WY\DOUGLAS_WATER_MP_103996427.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 4/18/2025

Figure 24. Douglas Water System (Transmission and Distribution)

7.2 Distribution Mains

Figure 25 shows the distribution mains within Douglas, broken down by material type and total length.



\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039984207.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 5/5/2025

Figure 25. Material Type of Douglas Transmission Mains and Distribution Lines

Since a large part of the City's water system consists of metallic pipe, it is recommended to implement a program for the timely replacement of these sections. Annual replacement efforts should be taken to reduce costs and support capital improvement planning for the large volume of pipe replacements needed. Later in this section, an evaluation of leakages will be discussed, highlighting the importance of implementing pipe replacements. In addition, a program to replace lead and copper pipes could be a useful tool to evaluate how and when pipe replacements should occur. The EPA Lead and Copper Rule Improvement states that 10% of all lines (copper and lead) should be replaced every year for a 10 year period (EPA, 2023). This guideline can be used to develop project implementation for all metallic lines, not just lead and copper.

Based on Figure 25, referenced in Table 29, indicates the replacement quantities to meet the 10% replacement criteria. This will be further detailed in the recommendations section of this master plan.

Table 29. Non-Plastic Pipe Replacement Quantities

Material	Installed Footage (ft)	Annual footage replacement to meet 10% target.
Unknown	4,564	456
Asbestos Concrete	3,045	305
Assumed Lead	533	533
Copper	815	815
Ductile Iron	95,835	9,584
Polyethylene	57	57
Steel	500	500

7.3 Storage

This section will describe and evaluate the storage facilities of the City of Douglas, broken down by storage facility.

7.3.1 Orpha Tank

Orpha tank is the main tank for the City of Douglas storage system. The LBES transmission line feeds directly into the Orpha tank and is distributed through the system when needed. This tank is located within the Orpha pressure zone. The line to Orpha is 16 inches and is connected directly into the transmission line. This tank stores 3 MG and replaced the original 1 MG tank in 2002. It is the largest tank of the storage system. Below is a site photo of Orpha. According to water operators, there

are no outstanding issues with the tank. As the main tank in the system, its levels vary from 22 to 29 feet depending on seasonal usage. Operators note that the system “floats” on the distribution system, as this is the main tank. The tank usually does not fill during the summer months due to high water demand. It should be noted that Orpha is currently being recoated as of the time of writing.



Figure 26. Site Photo of Orpha Tank

7.3.2 Clearfield Tank

The Clearfield tank is another source of storage for the City of Douglas, servicing the Clearfield pressure zone. This tank is connected to the system via a 12-inch main line. The Clearfield booster station allows water to be pumped into the tank. Established in the 1980s, this tank has undergone various structural improvements since its construction, listed in the review of information section of this report. The tank has a 1MG Capacity, with water levels ranging from 40 to 44 feet, foot-controlled by level switches at the Clearfield booster station. This tank is also in the process of being recoated.

7.3.3 Cemetery Tank

The Cemetery tank is the second largest storage tank in the City of Douglas. This tank was moved to its current site in the early 1970s. The tank is connected to the distribution system by two 14-inch lines and one 12-inch line. It has a capacity of 2 MG. This tank sits lower than all other pressure zones within the City. As a result, the tank was retrofitted with an altitude valve to allow for draining. A bypass pump is used in tandem with the valve to force water out of the tank, due to its lower elevation compared to the Clearfield and Orpha tanks. As a recommendation, the current tank could be retrofitted as a “reservoir” for irrigation while a new tank at a different site could be constructed to service the Orpha pressure zone, rather than only being able to service when drained. Below is a photo of the Cemetery tank.



Figure 27. Site Photo of Cemetery Tank

The retrofit to irrigation is discussed further in the recommendations section.

7.3.4 Sheep Mountain Tank

The final storage tank that the City of Douglas operates is the SMW tank. This tank connects to the SMW via an 8-inch line. This is not a true storage tank, but rather a holding tank for water that is produced from the well prior to transmission. The tank then feeds to a 12-inch line and is fed to the Chalke Buttes booster station. This tank has a 100 KG capacity and is used to feed users outside of the main distribution system. The relining of the interior of this tank was completed in the Fall of 2024.

7.3.5 Storage Evaluation

The storage tanks for the City of Douglas, discussed above, were evaluated using a supply storage analysis for each pressure zone. These tanks were broken out by the Orpha, Clearfield, and Sheep Mountain pressure zones. Both average day demand (ADD) and peak hour demand (PHD) were used to address future storage requirements for the system. These demands were provided by the hydraulic model in Section 8.0. Using these demands, each pressure zone was then assigned a population for the current year (2025) and 2045 for future projection. Total population projections were given in Section 2.0. Once a population was assigned, evaluation of each pressure zone was completed using the computed difference between the ADD and PHD for 4- and 6-hour events. Emergency water storage was assumed to be 1 day of average daily demand and fire flow was calculated at 2000 or 3500 gpm, depending on the zoning of the areas. Full calculations can be seen in the project notebook. The results of the storage evaluation indicated that no additional storage would be needed for the city in future years (2045). The total storage needed would be around 3.7 MG, and calculations were done removing cemetery tank from the total storage to see the effect on the system. On a pressure zone basis, Orpha is too small to have adequate storage for the 2045 estimate. There is a 200 KG deficit that would need to be made up by a new tank. The City should pursue additional storage from an operational standpoint as Orpha may need maintenance and may not be operational for periods of time. A backup tank (Cemetery Tank 2) would be the best alternative to alleviate any concerns of supply shortages during a maintenance period, as well as be adequate for the growth of the City.

7.4 Booster Stations and Control Buildings

7.4.1 Chalk Buttes Booster Station

The Chalk Buttes booster station is located near the intersection of Chalk Buttes Road and Esterbrook Road. This booster receives water from the SMW transmission line before being sent into the City distribution system. The station consists of two booster pumps that deliver a combined total of 222 GPM of water to the system from the transmission line. The pumps within the booster station also serve the Ridgewater Estates during times when the SMW is not actively producing water.

Additionally, there is a PRV in the station to reduce the pressure from the SMW transmission main.

Table 30. Chalk Buttes Pumps and PRVs

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Motor (Booster Pump #1)	WEG	99883247	1067641670	---	---
Pump (Booster Pump #1)	Grundfos	CF20-6 A-GJ-A-E-HQQE-NX2	A-999-17749-10000084	111	319/413 max
Motor (Booster Pump #2)	WEG	99883247	1067641486	---	---
Pump (Booster Pump #2)	Grundfos	CR20-6 A-GJ-A-E-HQQE-NX2	A-99917749-10000095	111	319/413 max
PRV	Cla-Val	92-07-114D	---	---	---

7.4.2 Clearfield Booster Station

The Clearfield booster station is located on Cheyenne Street near Douglas High School. This booster services the Clearfield pressure zone. Table 31 lists the motor and pump elements at the Clearfield station. As of the writing of this report, there are plans in place to replace elements within the booster station.

Table 31. Clearfield Booster Station Pump Elements

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Motor (Pump #1)	Dayton	3KW45G	FR4066303019	---	---
Pump #1	Pentair	16-2470722	---	---	---
Motor (Pump #2)	Baldor	---	F2410225436		
Pump #2	Aurora	77-9389-2	---	200	185
Motor (Pump #3)	Marathon Electric	FB-286TSTDR7001BEW	---	---	---

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Pump #3	Pentair	---	---	---	---

7.4.3 Wyoming Law Enforcement Academy (WLEA) Booster Station

The WLEA booster station services only one site, the Law Enforcement Academy. The location of this station is on Highway 59, near the intersection of Highway 93. This pump station was built to allow for high fire flow amounts in the event of an emergency at the WLEA, as well as raising the pressure to meet DEQ requirements as it sits above the Orpha pressure zone. There are four pumps at the station that allow for over 400 GPM of flow at any given time. There is also a large generator to allow for flow capabilities in the event of a power outage. At the time of the site visit in June 2024, all pumps were in good condition and operational. Table 32 lists all motors, pumps and PRVs at the WLEA station.

Table 32. WLEA Booster Station Pump Elements

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Motor (Pump #1)	Baldor	SFA 21-20/10	F0107253304	---	---
Pump #1	Grundfos	B 33Z96562 P1 0144 US1081	---	84	169
Control Valve (Pump #1)	Cla-Val	2-90-01ABCDS	90-01-3900J	---	---
Motor (Pump #2)	Baldor	84-Z00017	F0109280659	---	---
Pump #2	Grundfos	A 29Z53446 P1 0145 US79	---	150	180
Control Valve (Pump #2)	Cla-Val	3-90-01ABCDS	90-01-3651H	---	---
Motor (Pump #3)	Baldor	84.Z00017	F0108130739	---	---

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Pump #3	Grundfos	A 29Z53446 P1 0145 US77	---	150	180
Control Valve (Pump #3)	Cla-Val	3-90-01ABCDS	90-01-3651H	---	---
Motor (Pump #4)	Baldor	A15102C-55	C0111075005	---	---
Pump #4	Cornell Pump CO	6HH-CC 200-4	123951 16.44	2000	270
Control Valve (Pump #4)	Cla-Val	4-50-01B	50-01-66F	---	---

7.4.4 Inez Control Building

The Inez Control Building consists of a singular PRV/PSV to regulate the pressure of the LBES transmission line before reaching the Orpha tank. This PRV is a Cla-Val Model 27503460F. In addition, the building includes a chlorine injection point and magnetic flow meter within the structure. The make and model of these items were not collected during the site visit.

7.4.5 WYDOT Pump Building

The final building in the pump system is the WYDOT facility located in Douglas. This facility is operated by WYDOT instead of the City of Douglas. These pumps will not be evaluated further as they do not fall under the ownership of the City of Douglas. Table 33 lists all motors, pumps, and PRVs at the WYDOT station.

Table 33. WYDOT Pump Building Motors, Pumps, and PRVs

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Motor (Pump #1)	Baldor	35T150S254G1	F0212053752	---	---
Pump #1	Grundfos	A91134494P10503US532	---	30	159
Motor (Pump #2)	Baldor	84Z00H17	F0412214160	---	---

Equipment Type	Make	Model #	Serial #	GPM	Feet of Head
Pump #2	Grundfos	A29Z53883P10502US488	---	150	180
Motor (Pump #3)	Baldor	84Z00H17	F08122141165	---	---
Pump #3	Grundfos	A29Z53883P10502US488	---	150	180
PRV	Cla-Val	40-50-01B	---	---	---

7.4.6 Water Treatment Plant

The WTP has five total pumps. These pumps are broken into two categories, low lifts and high service. There are three low lift pumps, two of which were implemented into the system during the redesign of the plant and one of which is from prior operation. The two pumps installed during the redesign operate at a variable speed while the existing pump runs at a constant speed.

These pumps can deliver 900 GPM each and run in a lead-lag configuration to achieve a 2 MGD capacity. These pumps are part of the diversion structure that allow for water to be carried to the pre-sedimentation basins. After entering the clearwell, two high service pumps allow for water to be delivered to the City of Douglas. The high service pumps are also in a lead lag configuration, with the lag pump acting as a backup in the event the lead pump fails.

These pumps can reach the design capacity (2 MGD) from a single pump. At the time of this report, all pumps are in good condition with no operational issues. Descriptions for each pump are in the Table 34 below. Further information about pumps can be found in Appendix B.

Table 34. WTP Pump Table

Pump Name	Pump Type	Capacity
Low Lift 1 (Backup)	Constant Speed	N/A*
Low Lift 2 (Lead)	VFD	350-900 GPM
Low Lift 3 (Lag)	VFD	350-900 GPM
High Service 1 (Lead)	VFD	350-1400 GPM
High Service 2 (Lag)	VFD	350-1400 GPM

* Information unable to be collected

7.4.7 Booster Station Evaluation

Using data from the storage evaluation, and data provided from the hydraulic model, estimates of total pumping capacity for pumping stations within the City of Douglas service area were completed. Pumping capacities were given by CEPI, and the Clearfield pumps were assumed to be 650 gpm due to the upgrades currently taking place. The analysis indicated that current pumping capacities are adequate for the future scenario evaluated. As a note, Orpha zone pumps may need to be evaluated closer due to the water treatment plant issues that could potentially limit total output. Full evaluation can be seen in the project notebook.

7.5 System Instrumentation and Controls

The following section details the controls and system instrumentation used within the Douglas Water System. These controls were evaluated as they are applicable to operation and maintenance of the overall system.

7.5.1 System Buildings

LBES BARBER CONTROL BUILDING

The instrumentation at the Spring Site Chlorine Building is in good condition, operating correctly, and well-maintained.

The instrumentation at the Spring Site Chlorine Building consists of the following:

Table 35. LBES Chlorination I&C's

Device	Service	Manufacturer	Model
Transmitter	Chlorine Scales	ForceFlow	Wizard4000
Transmitter	Chlorine Gas	Hydro Instruments	GA-180

LBES INEZ CONTROL BUILDING

The instrumentation at the Spring Site Pressure Control location is in good condition, operating correctly, and well-maintained.

The instrumentation at the Spring Site Pressure Control Building consists of the following:

Table 36. LBES Pressure Building I&C's

Device	Service	Manufacturer	Model
Transmitter	Valve Inlet	Rosemount	3051
Transmitter	Valve Outlet	Rosemount	3051

Device	Service	Manufacturer	Model
Transmitter	Analytical	Hach	sc1000
Sensor	Chlorine	Hach	CLF10sc
Sensor	Turbidity	Hach	TU5300sc
Sensor	Conductivity	Hach	3400
Sensor	pH	Hach	pHDsc

SHEEP MOUNTAIN WELL BUILDING

A bubbler system is being used as a temporary solution for the failed down hole submersible level transmitter. During the site visit, the operations staff mentioned their plan to replace the failed level sensor and add a redundant sensor the next time the well is pulled for service. Product information for the existing downhole submersible sensor was not available during the site visit. The well flow meter installed at this location is no longer available from the manufacturer and the successor product is the Proline Promag W 400. In addition, it should be noted that the chlorine gas is provided via a pressure pump due to allow for a pressure differential for vacuum feeding of the chlorine into the line.

Instrumentation at the SMW building consists of the following:

Table 37. SMW I&C's

Device	Service	Manufacturer	Model
Sensor	Well Flow	Endress & Hauser	Promag 50W2H (8")
Transmitter	Well Flow	Endress & Hauser	Promag 50
Transmitter	Well Level	USA Blue Book	67522
Transmitter	Chlorine Gas	Hydro Instruments	GA-170
Transmitter	Chlorine Scales	ForceFlow	Wizard4000

7.5.2 Treatment Plant

The instrumentation at the WTP consists of a mixture of old and new equipment. Some of the older equipment is obsolete; Table 38 below reflects affected equipment. At the time of the site visit, the filter box turbidity analyzers (AE/AIT-3001/3002/3003) were not in service due to the operational mode of the treatment plant. The operations staff explained that these analytical elements are removed

each winter to prevent freezing. Additionally, the effluent turbidity meter (AE/AIT-4002) was disconnected from power during the site visit. The installed Hach sc100 and sc200 controllers are no longer actively supported by the manufacturer and the successor product is the sc4500 controller.

Instrumentation at the WTP consists of the following:

Table 38. WTP I&C's

Device	Service	Manufacturer	Model
AE-1001	Influent Turbidity	Hach	SS7 Turbidimeter
AIT-1001	Influent Turbidity	Hach	sc4500
AE-1002	Influent pH	Hach	DPD1P1
AIT-1002	Influent pH	Hach	sc100 (Obsolete)
FE-1003	Influent Flow	Endress & Hauser	N/A*
FIT-1003	Influent Flow	Endress & Hauser	Promag 50
LIT-2001	Presed Cell 1 Level	Endress & Hauser	Prosonic M
LSH-2001	Plant Drain Sump	N/A*	N/A *
LIT-2002	Presed Cell 2 Level	Endress & Hauser	Prosonic M
LIT-3001	Filter Effluent Box 1 Level	Endress & Hauser	Prosonic M
AE-3001	Filter Effluent Box 1 Turbidity	Hach	N/A *
AIT-3001	Filter Effluent Box 1 Turbidity	Hach	sc4500
LIT-3002	Filter Effluent Box 2 Level	Endress & Hauser	Prosonic M
AE-3002	Filter Effluent Box 2 Turbidity	Hach	N/A *
AIT-3002	Filter Effluent Box 2 Turbidity	Hach	sc4500
LIT-3003	Filter Effluent Box 3 Level	Endress & Hauser	Prosonic M
AE-3003	Filter Effluent Box 3 Turbidity	Hach	N/A *
AIT-3003	Filter Effluent Box 3 Turbidity	Hach	sc4500
LSH-4001	Chlorine Injection Manhole	N/A*	N/A *
LIT-4001	Clearwell Level	Dwyer	IWP-00
FE-4001	Effluent Flow	N/A*	N/A *

Device	Service	Manufacturer	Model
FIT-4001	Effluent Flow	N/A	N/A
AE-4001	Effluent Chlorine	Hach	CL17sc
AIT-4001	Effluent Chlorine	Hach	sc200 (Obsolete)
AE-4002	Effluent Turbidity	Hach	TU5300sc
AIT-4002	Effluent Turbidity	Hach	sc200 (Obsolete)
LIT-4002	East Storage Tank	N/A	N/A
AE-4003	Effluent pH	Hach	DPD1P1
AIT-4003	Effluent pH	Hach	sc100 (Obsolete)

* Data was unable to be collected.

As explained in the source evaluation, the treatment plant faces many operational difficulties outside of the instrumentation. Therefore, a complete overhaul of the treatment system is recommended to allow for higher treatment capacity within the Douglas water system.

7.5.3 Chalk Buttes Booster Station

The flow meters installed at this location are no longer available from the manufacturer and the successor product is the Proline Promag W 400.

Instrumentation at the Chalk Buttes Booster consists of the following:

Table 39. Chalk Buttes Booster Station I&C's

Device	Service	Manufacturer	Model
Sensor	Valve Flow	Endress & Hauser	Promag 50W2H (8")
Transmitter	Valve Flow	Endress & Hauser	Promag 50
Sensor	Pump Flow	Endress & Hauser	Promag 50W2H (6")
Transmitter	Pump Flow	Endress & Hauser	Promag 50
Sensor	Free Chlorine	Hach	CL10Fsc
Transmitter	Free Chlorine	Hach	sc200 (Obsolete)
Transmitter	Inlet Pressure	Rosemount	N/A *
Transmitter	Outlet Pressure	Dwyer	IWP-03

* Data was unable to be collected.

7.5.4 Clearfield Booster Station

The flow meter installed at this location is no longer available from the manufacturer and the successor product is the Proline Promag W 400.

Instrumentation at the Clearfield Booster consists of the following:

Table 40. Clearfield I&C's

Device	Service	Manufacturer	Model
Sensor	Pump Flow	Endress & Hauser	Promag 50W2H
Transmitter	Pump Flow	Endress & Hauser	Promag 50
Transmitter	Level	N/A*	N/A*

* Data was unable to be collected

7.5.5 WLEA Booster Station

The flow meter flow tube has discoloration on the flanges; however, this is cosmetic and will not affect the operation of the instrument. The flow meter installed at this location is no longer available from the manufacturer and the successor product is the Proline Promag W 400. The pressure instruments at this site were manufactured by Invensys; this instrument product line has since been purchased by Schneider Electric and is currently sold under the Foxborough name.

The Instrumentation at the WLEA booster station consists of the following:

Table 41. WLEA I&C's

Device	Service	Manufacturer	Model
Sensor	Flow	Endress & Hauser	Promag 50W2H *
Transmitter	Flow	Endress & Hauser	Promag 50
Transmitter	Discharge Pressure	Invensys	IGP10
Transmitter	Tank Level	Invensys	IGP10
Transmitter	Suction Pressure	Invensys	IGP10

* Size was not determined

7.6 System SCADA

7.6.1 WTP

The City of Douglas' water treatment and distribution SCADA System utilizes the FactoryTalk View Site Edition (SE) platform which runs on a Dell Precision 3260

desktop PC. This SCADA PC has the following specifications: Windows 10 Pro operating system, 16 GB of RAM, 400 GB hard disk drive, and a 12th Gen Intel Core i7-12700 processor. SCADA Software Licenses are installed for the FactoryTalk View development environment, one FactoryTalk View display client, and one FactoryTalk View 100 display server. A 4TB Western Digital MyBook external hard drive is connected to the SCADA PC and configured to take regular backups. The operator workstation utilizes four monitors to display critical areas of the treatment process and distribution system. Before the HDR site visit, the historical database for the SCADA application was migrated from a Microsoft Access Database to a SQL Server database.

Alarm notifications for the SCADA system are dialed out via a RACO Catalyst Interactive Communications System. The operations staff can enable and disable specific alarms via a dedicated Human Machine Interface (HMI) graphic. A Barnett ProTalk B1285 notification system is installed in the WTP PLC Panel, but this device has been abandoned.

The WTP is controlled by an Allen-Bradley ControlLogix 5561 Processor mounted in a 17-slot chassis. The chassis also houses three EtherNet/IP communications modules (one is out of use), two 16-point AC discrete input modules, two 8-point relay output modules, four 8-point analog input modules, and one 8-point analog output module.

The SCADA system consists of the eight sites listed below. The remote sites are polled by an Allen Bradley MicroLogix1400 Programmable Logic Controller (PLC) via a ZumLink 900MHz Spread Spectrum radio network. The MicroLogix1400 is installed in an electrical room on the back side of the WTP control room. The radio network was upgraded in 2019 along with other upgrades to the Remote Telemetry Units (RTU); other upgrades will be discussed in the following sub-sections. An inspection of the radio equipment revealed a lack of dedicated weatherproofing kits on the exterior coaxial connections and the absence of grounding kits for the coaxial cables. The MicroLogix1400 PLC’s and the Stratix unmanaged ethernet switches are currently in the "Active Mature" lifecycle state. While these products are still fully supported, newer products are available. A migration plan should be considered for when these units fail.

1. Water Treatment Plant
2. Spring Site
3. Sheep Mountain #1 Well
4. Chalk Buttes Booster
5. Clearfield Booster

6. Law Enforcement Pump Station
7. Orpha Tank
8. Cemetery Tank.

Information from the remote sites is displayed on the SCADA HMI and an Allen-Bradley PanelView Operator Interface Terminal (OIT) installed in the control room. The OIT allows the operations staff to monitor the remote sites in the event the SCADA HMI is unavailable.

At the time of the site visit, remote access to the SCADA system was not possible.

7.6.2 Chalk Buttes Booster Station

The Chalk Buttes Booster RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure and contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), an expansion IO compliment of two 4-point analog input cards, and one 4-point analog output card. In addition to the PLC system, the RTU includes:

Table 42. Chalk Buttes SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
Analog Output Card	Allen Bradley	1762-OF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-U85T (Active/Mature)
DC Power Supply	Rhino	PSB24-120S
Radio	ZumLink	Z9-PE2
UPS	APC	BE600M1

The RTU Panel was constructed in a workmanlike manner, is well-labeled, provides room for future expansion, and is mounted indoors. However, a copy of the wiring schematics was not located within the enclosure.

7.6.3 Clearfield Booster Station

The Clearfield Booster RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs

(voltage only), two analog outputs (voltage only), and an expansion IO compliment of two 4-point analog input cards. In addition to the PLC system, the RTU includes:

Table 43. Clearfield Booster SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-U85T (Active/Mature)
DC Power Supply	Rhino	PSB24-120S
Radio	ZumLink	Z9-PE2
UPS	APC	BE600M1

The RTU Panel was constructed in a workmanlike manner, is well-labeled, and provides room for future expansion. However, a copy of the wiring schematics was not located within the enclosure.

During our site visit, it was discussed that this RTU would be replaced.

7.6.4 Sheep Mountain Well

The SMW RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure and contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), an expansion IO compliment of two 4-point analog input cards, and one 4-point analog output card. In addition to the PLC system, the RTU includes:

Table 44. SMW SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
Analog Output Card	Allen Bradley	1762-OF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-U85T (Active/Mature)
DC Power Supply	Rhino	PSB24-120S
Radio	ZumLink	Z9-PE2
UPS	APC	BE600M1

The RTU Panel was constructed in a workmanlike manner, is well-labeled, and provides room for future expansion. However, a copy of the wiring schematics was not located within the enclosure. This panel is mounted indoors.

7.6.5 WLEA Booster Station

The WLEA Booster RTU was upgraded in 2019. The RTU panel is a NEMA 1 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), an expansion IO compliment of one 4-point analog input card, and one 4-point analog output card. In addition to the PLC system, the RTU includes:

Table 45. WLEA SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
Analog Output Card	Allen Bradley	1762-OF4
OIT	Allen Bradley	2711R-T10T
DC Power Supply	Rhino	PSB24-120S
UPS	APC	BE600M1

The existing enclosure was re-used at this site and a back panel with new equipment was supplied during the 2019 upgrade.

A ZumLink 900MHz radio, an Allen-Bradley five-port unmanaged ethernet switch, and a Phoenix Contact 24VDC power supply are housed in a separate NEMA 4/12 painted steel enclosure mounted adjacent to the RTU enclosure.

Table 46. WLEA Secondary SCADA Devices

Device	Manufacturer	Model
DC Power Supply	Phoenix Contact	QUINT-PS/1AC/24DC/5
Radio	ZumLink	Z9-PE2
Ethernet Switch	Allen Bradley	1783-U85T (Active/Mature)

Both panels are mounted indoors.

The RTU and Radio Panel were upgraded in a workmanlike manner, are well labeled, and provide room for future expansion. However, a copy of the wiring schematics was not located within the enclosure.

7.6.6 Cemetery Tank

The Cemetery tank RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), and an expansion IO compliment of one 4-point analog input card. In addition to the PLC system, the RTU includes:

Table 47. Cemetery Tank SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BWAA
Analog Input Card	Allen Bradley	1762-IF4
Panel Meter	RedLion	PAXD0010
DC Power Supply	Rhino	PSB24-120S
Radio	ZumLink	Z9-PE2
UPS	APC	BE600M1

The Red Lion Panel meter is used to indicate the tower level locally. This enclosure is mounted outdoors.

This location acts as a radio repeater site and includes two Yagi antennas.

The RTU Panel was constructed in a workmanlike manner, is well-labeled, and provides room for future expansion. However, a copy of the wiring schematics was not located within the enclosure.

7.6.7 Orpha tank

The Orpha tank RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO complement of 20 discrete inputs, 12 relay outputs, an expansion IO complement of two 4-point analog input cards, and one 4-point analog output card. In addition to the PLC system, the RTU includes:

Table 48. Orpha Tank SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXB
Analog Input Card	Allen Bradley	1762-IF4
Analog Output Card	Allen Bradley	1762-OF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-U85T (Active/Mature)

Device	Manufacturer	Model
DC Power Supply	Rhino	PSB24-120S
Radio	ZumLink	Z9-PE2
UPS	APC	BE600M1

The RTU Panel was upgraded in a workmanlike manner, is well labeled, and provides room for future expansion. However, a copy of the wiring schematics was not located within the enclosure. This enclosure is mounted indoors. This location acts as a radio repeater site and includes two Yagi antennas.

7.6.8 Barber Control Building

The LBES Site Chlorination Building RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), and an expansion IO compliment of one 2-point analog input, 2-point analog output card, and two 4-point analog output cards. In addition to the PLC system, the RTU includes:

Table 49. Barber Control Building SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-US5T (Active/Mature)
DC Power Supply	Rhino	PSM24-0905
UPS	APC	BE600M1

This location has a separate NEMA 4/12 painted steel radio enclosure, which houses a ZumLink 900MHz radio, a Phoenix Contact 900MHz IO radio, a Rhino 24VDC Power supply, and an APC Uninterruptible Power Supply.

Table 50. Barber Control Building Secondary SCADA Devices

Device	Manufacturer	Model
Radio	Phoenix Contact	RAD-900-IFS
Radio Module	Phoenix Contact	RAD-DAIO6-IFS
Radio	ZumLink	Z9-PE2
DC Power Supply	Rhino	PSB24-0120S
UPS	APC	BE600M1

Both enclosures at this location are mounted indoors.

The panels at this location do not exhibit the same workmanlike quality as the other locations. The labeling is not as consistent, and the wiring routing is not as organized. A set of wiring schematics was not located in the enclosures.

7.6.9 Inez Control Building

The LBES Site Pressure Control Building RTU was upgraded in 2019. The RTU panel is a NEMA 4/12 painted steel enclosure. It contains an Allen-Bradley MicroLogix1400 PLC with an onboard IO compliment of 20 discrete inputs, 12 relay outputs, four analog inputs (voltage only), two analog outputs (voltage only), and an expansion IO compliment of one 4-point analog output card and four 4-point analog input cards. In addition to the PLC system, the RTU includes:

Table 51. Inez Control Building SCADA Devices

Device	Manufacturer	Model
PLC	Allen Bradley	1766-L32BXBA
Analog Input Card	Allen Bradley	1762-IF4
Analog Output Card	Allen Bradley	1762-OF4
OIT	Allen Bradley	2711R-T7T
Ethernet Switch	Allen Bradley	1783-US5T (Active/Mature)
DC Power Supply	Rhino	PSM24-0905
UPS	APC	BE600M1

This enclosure is mounted inside the pressure control building.

The RTU Panel was constructed in a workmanlike manner and is well-labeled, but it does not provide room for future expansion. A copy of the wiring schematics was not located within the enclosure.

7.6.10 LBES Spring House

The LBES site spring house has two NEMA 4/12 painted steel control enclosures, both mounted outdoors. The first is the solar charger enclosure which houses a SunSaver solar charge controller, two Deka gel cell batteries, and a FlowLine digital panel meter. This enclosure has been modified to house the current components in the field.

Table 52. LBES Spring House Solar SCADA Devices

Device	Manufacturer	Model
Charge Controller	SunSaver	SS-10L-24V
Solar Battery	Deka	8G30H
Panel Meter	FlowLine	LI55

The second is the radio enclosure which contains a Phoenix Contact 900MHz IO radio. The IO radio transmits the reservoir level to the Spring Site Chlorine Building. The on-site solar power system supplies incoming power for both enclosures.

Table 53. Spring House Radio SCADA Devices

Device	Manufacturer	Model
Radio	Phoenix Contact	RAD-900-IFS
Radio Module	Phoenix Contact	RAD-DAIO6-IFS
Radio Module	Phoenix Contact	N/A*

* Data was unable to be collected

The solar charger enclosure does not exhibit the same workmanlike quality as those at other locations. It includes minimal labelling and does not employ a robust wire management strategy. The radio enclosure is labeled, tidy, and workmanlike.

7.6.11 LBES Radio Repeater

The LBES Radio Repeater site has a single NEMA 4/12 painted steel control enclosure mounted outdoors. The enclosure contains a Rhino 24VDC power supply, a ZumLink 900MHz radio, and an APC Uninterruptible Power Supply.

Table 54. Spring Repeater SCADA Devices

Device	Manufacturer	Model
Radio	ZumLink	Z9-PE2
DC Power Supply	Rhino	PSB24-0120S
UPS	APC	BE600M1

7.7 SCADA Cybersecurity Evaluation

In water treatment operations, securing operational technology (OT) networks is critical to ensuring public health and environmental safety. A comprehensive approach involves aligning with the ISA/IEC 62443 cybersecurity standards, implementing the Purdue Model for network segmentation, and complying with the America's Water Infrastructure Act (AWIA) Section 2013. ISA 62443 provides a structured framework for securing industrial automation and control systems (IACS), emphasizing defense-in-depth, risk-based security levels, and the creation of zones and conduits to isolate critical assets (International Society of Automation, 2025). The Purdue Model complements this by organizing systems into hierarchical levels—from enterprise IT (Level 5) down to physical processes (Level 0)—which helps define trust boundaries and enforce least privilege access.

AWIA Section 2013, which amended Section 1433 of the Safe Drinking Water Act, mandates that all community water systems serving more than 3,300 people

conduct a Risk and Resilience Assessment (RRA) and develop an Emergency Response Plan (ERP) every five years (United States Environmental Protection Agency, 2025).

These assessments must evaluate risks from malevolent acts and natural hazards across physical infrastructure, SCADA systems, cybersecurity, chemical handling, and operational practices. The ERP must then incorporate strategies to mitigate these risks, including cybersecurity incident response procedures. By integrating ISA 62443 and the Purdue Model into the AWIA-mandated RRA and ERP processes, water utilities can not only meet regulatory requirements but also build a resilient, secure, and future-ready OT environment.

7.7.1 General Observations:

The utility makes use of radio communications at several points, for I/O and telemetry. The equipment is recent in vintage and does support security. The configuration of the radios should have the level of encryption verified.

The workstation and communications equipment are directly connected to a consolidated OT network, which reduces the attack surface and therefore helps bolster the cybersecurity posture. However, there are still several areas of improvement that should be considered now, prior to completing an AWIA assessment.

7.7.2 Areas of Improvement

1. SCADA PC Operating System

The SCADA PC uses Windows 10, which will reach End of Support on October 14, 2025. The final feature release is version 22H2. This release will continue to receive updates until October 14th. After that date, additional security updates will not be provided.

The SCADA PC running Windows 10 should be updated to Windows 11 and all updates and patches applied.

2. FactoryTalk View License version –

If the system is updated to Windows 11, the version of FactoryTalk may need to be updated as well. The minimum version of FactoryTalk View that indicates that it is fully compatible with Windows 11 is version 14.0. If the current version is not v14.0 or higher, the software will need to be updated. Provided the software is still under vendor support, this should be a no-cost update.

3. ZumLink Radio Modems Encryption strength –

The ZumLink radio modems require their data encryption settings to be checked and potentially adjusted. The modem supports 128-bit and 256-bit AES CCM. The modems should be set to the strongest level of encryption possible, which is 256-bit.

4. Off-site backups

Currently, the 4TB Western Digital external hard drive is connected to the SCADA PC and configured to take regular backups. It is recommended that these backups, as well as all of the PLC program and radio configuration backups, be stored off-site from the SCADA PC to provide the ability to back up all control programs/configurations.

Recommendation

It is recommended that the utility undergo an AWIA Cybersecurity evaluation. This will perform a more comprehensive investigation into the utility's cyber posture and provide additional corrective recommendations. This type of survey is also required 3by the American Water and Infrastructure Act (AWIA) of 2018.

7.8 Water Losses

The water losses of the City of Douglas were evaluated by comparing the billing rates from the finance department to the consumption records from the water supervisor and evaluating large discrepancies.

7.8.1 Billing Rates

The water billing rates for the City of Douglas were attained through the finance department. These records were broken down by a monthly billing rate of how many MG were billed. Using this information, the rates were assessed alongside the consumption rates attained by the water supervisor. The rates for consumption were taken daily and were compiled into a monthly basis. Once that was completed, the

rates for billed versus consumed were compared as a percentage. Below are the results of this comparison.

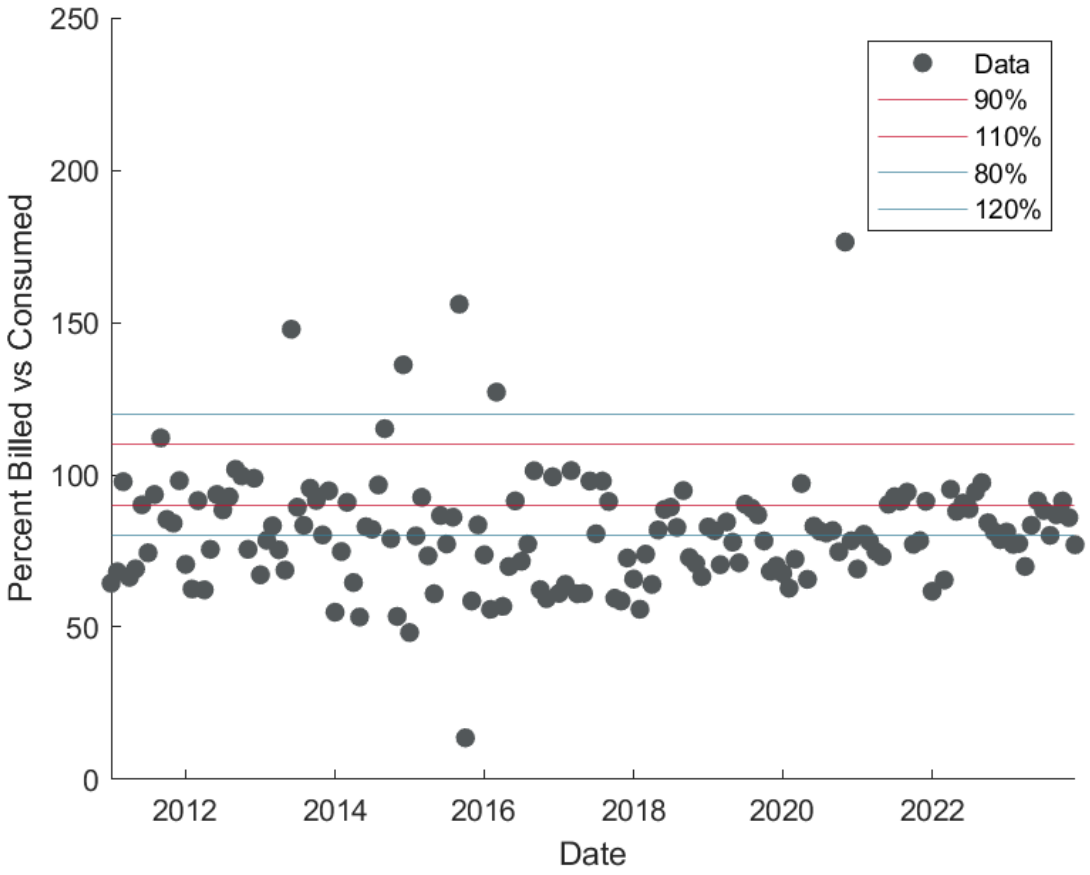


Figure 28. Comparison of Billed and Consumed Rates

This figure shows the monthly rates of billing as compared to what was consumed. For reference, lines at 80%, 90%, 110%, and 120% were shown. These rates were chosen as the bounds of where the water billing should be taking place, within the range of 80% to 120%. This figure shows many the rates were much lower than the 80% threshold give. In addition, some of the billing rates show a much higher rate than that of what was consumed. The City of Douglas implemented a new metering system after 2020, which did help with the overall billing consistency. There were still some outlying data points which require some further evaluation. Due to this fact, the following figure was created to illustrate the discrepancy between the consumed and billed rates.

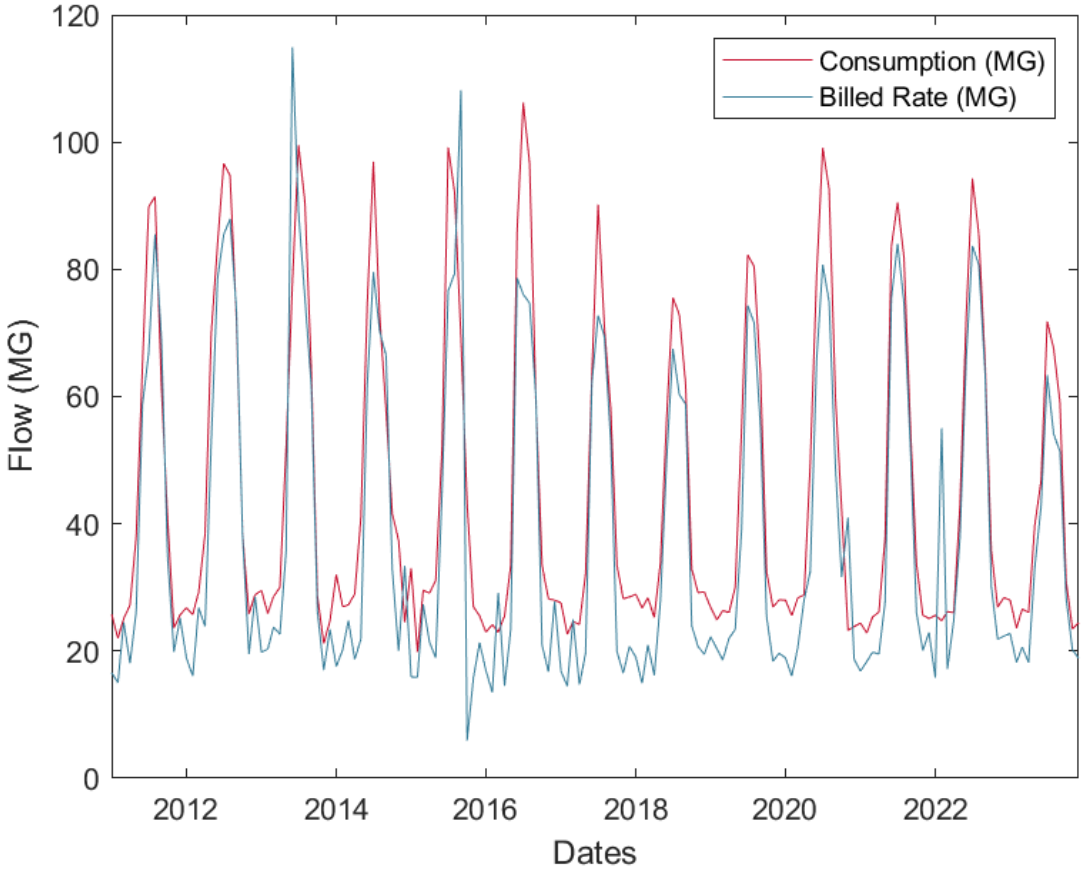
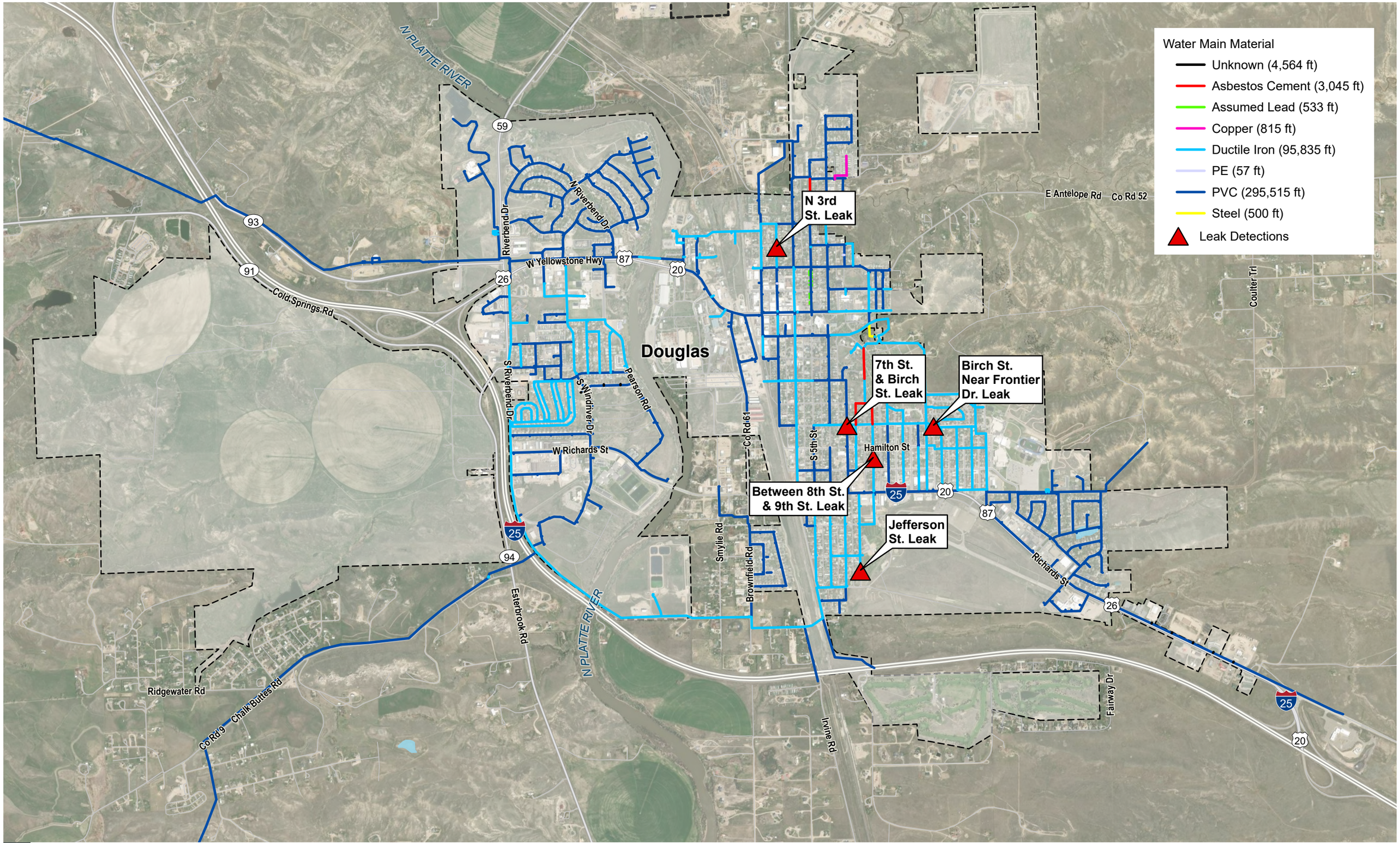


Figure 29. Flow Rates of Billed and Consumed Rates

This figure also shows large discrepancies in the rates. Usually in consumption and billing records, there is a lag due to the bills being a month behind consumption. This data was correlated by the peaks to show the true billing cycle in comparison to the consumption reports provided. In addition, large dips and peaks show that the billing rates to not always provide the most accurate system in terms of water usage. Both figures show a need for a leak testing study to take place and will be discussed later in this section.

7.8.2 Leak Detection

A system leak study was recommended to take place within the City of Douglas due to the large discrepancies in the billing rates. American Leak Detection conducted a test of all areas relating to metal pipes within the City of Douglas. In the report, five leaks were found within the City of Douglas limits. These leaks were all attributed to ductile iron pipes. A map below shows the leaks detected. It is recommended that bill period cycling and data collection is evaluated to ensure harmonization with production data. This will help in developing cleaner water balancing and evaluation of system performance in the future.



0 0.5 mi

LEAK DETECTION ANALYSIS
DOUGLAS WATER SYSTEM
DOUGLAS, WY

\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039964217.2_WIP\APRX\DOUGLAS_WATER_MP_NEW.APRX DATE: 5/19/2025

Figure 30. Leaks Detected in Douglas

Below is the description of the leaks that were found while conducting the study, in no order. The size of leak is noted in the description of each.

1. One leak, near the hydrant on South 11th Street and Erwin Street was found to be small and stopped by tightening the fire hydrant.
2. Along North 3rd Street between Clay and Cedar: Several pinhole leaks detected; peak leak estimated near Poplar Street
3. Birch Street near Frontier Drive: Large leak (> 10 GPM), confirmed with microphone
4. South Jefferson Street: Leak (< 5 GPM) near the valve at the dead end of the line
5. 7th and Birch Street: Small leak, may be remedied by flushing and reclosing hydrant
6. Between South 8th and 9th Street along Hamilton: Leak detected, was repaired before survey was completed

As a recommendation, these leaks within the DIP of the system should be replaced to prevent large water losses in the future.

7.9 Overall System Evaluation

The water system of Douglas is in good condition but still requires proactive maintenance and replacement to ensure that system quality is not compromised in the coming years. The sections above highlight some operational challenges and needed repairs, namely the Cemetery tank, leaking pipes, and the low production of the WTP. These repairs highlight immediate needs to allow for smoother operation of the water system and prevent large future water losses. The low production of the WTP is the biggest hurdle for Douglas to overcome to ensure continuous water deliveries. With that, storage considerations would be considered in tandem with this potential upgrade of the WTP. The status of Cemetery Tank, along with its age makes it a prime candidate for replacement to ensure that storage capacities meet or exceed the needs of Douglas in the future. In addition, the City should anticipate costs associated with the replacement of system components still in good operating condition. To help the city plan for these replacements, HDR has developed potential cost schedules of replacements for all the pipe in the City. These are broken down into three tables below. The first table is the replacement of all non-plastic piping within the city over the next 10 years as discussed in Section 7.2. The second includes the replacement of all plastic piping after the initial 10 years (2035-2045). This table is extensive and does not mean that the entirety of plastic pipe needs to be replaced but is given as a potential guide for replacement during the period of evaluation. The third table indicates major process elements that may need to be replaced within the planning period. Each of these tables have had costs escalated for current

inflation (2.3% at the time of writing) year over year. These costs should be reevaluated overtime as inflation rates can and will change.

Table 55. 10 Year Cost Estimate of Non-Plastic Pipe

Component	Unit	Length (LF)	Replacement per Year (10 Year Period) (Pipe Only)	2025 Unit Price Cost	2026		2027		2028		2029		2030	
					Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost
6 in Asbestos Cement	LF	2100	210	$ 15.00	$ 15.35	$ 3,222.45	$ 15.70	$ 3,296.57	$ 16.06	$ 3,372.39	$ 16.43	$ 3,449.95	$ 16.81	$ 3,529.30
14 in Asbestos Cement	LF	1000	100	$ 100.00	$ 102.30	$ 10,230.00	$ 104.65	$ 10,465.29	$ 107.06	$ 10,705.99	$ 109.52	$ 10,952.23	$ 112.04	$ 11,204.13
0.75 in Assumed Lead	LF	1100	110	$ 7.50	$ 7.67	$ 843.98	$ 7.85	$ 863.39	$ 8.03	$ 883.24	$ 8.21	$ 903.56	$ 8.40	$ 924.34
4 in Cast Iron	LF	2500	250	$ 20.00	$ 20.46	$ 5,115.00	$ 20.93	$ 5,232.65	$ 21.41	$ 5,353.00	$ 21.90	$ 5,476.11	$ 22.41	$ 5,602.07
6 in Cast Iron	LF	1100	110	$ 35.00	$ 35.81	$ 3,938.55	$ 36.63	$ 4,029.14	$ 37.47	$ 4,121.81	$ 38.33	$ 4,216.61	$ 39.21	$ 4,313.59
8 in Cast Iron	LF	1400	140	$ 45.00	$ 46.04	$ 6,444.90	$ 47.09	$ 6,593.13	$ 48.18	$ 6,744.77	$ 49.29	$ 6,899.90	$ 50.42	$ 7,058.60
2 in Copper	LF	900	90	$ 10.00	$ 10.23	$ 920.70	$ 10.47	$ 941.88	$ 10.71	$ 963.54	$ 10.95	$ 985.70	$ 11.20	$ 1,008.37
2 in Ductile Iron	LF	100	10	$ 10.00	$ 10.23	$ 102.30	$ 10.47	$ 104.65	$ 10.71	$ 107.06	$ 10.95	$ 109.52	$ 11.20	$ 112.04
2.5 in Ductile Iron	LF	100	10	$ 12.50	$ 12.79	$ 127.88	$ 13.08	$ 130.82	$ 13.38	$ 133.82	$ 13.69	$ 136.90	$ 14.01	$ 140.05
3 in Ductile Iron	LF	300	30	$ 15.00	$ 15.35	$ 460.35	$ 15.70	$ 470.94	$ 16.06	$ 481.77	$ 16.43	$ 492.85	$ 16.81	$ 504.19
4 in Ductile Iron	LF	2000	200	$ 20.00	$ 20.46	$ 4,092.00	$ 20.93	$ 4,186.12	$ 21.41	$ 4,282.40	$ 21.90	$ 4,380.89	$ 22.41	$ 4,481.65
6 in Ductile Iron	LF	41600	4160	$ 35.00	$ 35.81	$ 148,948.80	$ 36.63	$ 152,374.62	$ 37.47	$ 155,879.24	$ 38.33	$ 159,464.46	$ 39.21	$ 163,132.14
8 in Ductile Iron	LF	5700	570	$ 45.00	$ 46.04	$ 26,239.95	$ 47.09	$ 26,843.47	$ 48.18	$ 27,460.87	$ 49.29	$ 28,092.47	$ 50.42	$ 28,738.60
10 in Ductile Iron	LF	100	10	$ 65.00	$ 66.50	$ 664.95	$ 68.02	$ 680.24	$ 69.59	$ 695.89	$ 71.19	$ 711.89	$ 72.83	$ 728.27
12 in Ductile Iron	LF	31700	3170	$ 75.00	$ 76.73	$ 243,218.25	$ 78.49	$ 248,812.27	$ 80.29	$ 254,534.95	$ 82.14	$ 260,389.26	$ 84.03	$ 266,378.21
14 in Ductile Iron	LF	15100	1510	$ 100.00	$ 102.30	$ 154,473.00	$ 104.65	$ 158,025.88	$ 107.06	$ 161,660.47	$ 109.52	$ 165,378.67	$ 112.04	$ 169,182.37
16 in Ductile Iron	LF	500	50	$ 135.00	$ 138.11	$ 6,905.25	$ 141.28	$ 7,064.07	$ 144.53	$ 7,226.54	$ 147.86	$ 7,392.75	$ 151.26	$ 7,562.79
20 in Ductile Iron	LF	100	10	$ 200.00	$ 204.60	$ 2,046.00	$ 209.31	$ 2,093.06	$ 214.12	$ 2,141.20	$ 219.04	$ 2,190.45	$ 224.08	$ 2,240.83
3 in Galvanized Iron	LF	700	70	$ 15.00	$ 15.35	$ 1,074.15	$ 15.70	$ 1,098.86	$ 16.06	$ 1,124.13	$ 16.43	$ 1,149.98	$ 16.81	$ 1,176.43
Totals						$ 619,068.45		$ 633,307.02		$ 647,873.09		$ 662,774.17		$ 678,017.97

Component	2031		2032		2033		2034		2035	
	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost
6 in Asbestos Cement	$ 17.19	$ 3,610.48	$ 17.59	$ 3,693.52	$ 17.99	$ 3,778.47	$ 18.41	$ 3,865.37	$ 18.83	$ 3,954.28
14 in Asbestos Cement	$ 114.62	$ 11,461.83	$ 117.25	$ 11,725.45	$ 119.95	$ 11,995.13	$ 122.71	$ 12,271.02	$ 125.53	$ 12,553.25
0.75 in Assumed Lead	$ 8.60	$ 945.60	$ 8.79	$ 967.35	$ 9.00	$ 989.60	$ 9.20	$ 1,012.36	$ 9.41	$ 1,035.64
4 in Cast Iron	$ 22.92	$ 5,730.91	$ 23.45	$ 5,862.72	$ 23.99	$ 5,997.57	$ 24.54	$ 6,135.51	$ 25.11	$ 6,276.63
6 in Cast Iron	$ 40.12	$ 4,412.80	$ 41.04	$ 4,514.30	$ 41.98	$ 4,618.13	$ 42.95	$ 4,724.34	$ 43.94	$ 4,833.00
8 in Cast Iron	$ 51.58	$ 7,220.95	$ 52.76	$ 7,387.03	$ 53.98	$ 7,556.93	$ 55.22	$ 7,730.74	$ 56.49	$ 7,908.55
2 in Copper	$ 11.46	$ 1,031.56	$ 11.73	$ 1,055.29	$ 12.00	$ 1,079.56	$ 12.27	$ 1,104.39	$ 12.55	$ 1,129.79
2 in Ductile Iron	$ 11.46	$ 114.62	$ 11.73	$ 117.25	$ 12.00	$ 119.95	$ 12.27	$ 122.71	$ 12.55	$ 125.53
2.5 in Ductile Iron	$ 14.33	$ 143.27	$ 14.66	$ 146.57	$ 14.99	$ 149.94	$ 15.34	$ 153.39	$ 15.69	$ 156.92
3 in Ductile Iron	$ 17.19	$ 515.78	$ 17.59	$ 527.65	$ 17.99	$ 539.78	$ 18.41	$ 552.20	$ 18.83	$ 564.90
4 in Ductile Iron	$ 22.92	$ 4,584.73	$ 23.45	$ 4,690.18	$ 23.99	$ 4,798.05	$ 24.54	$ 4,908.41	$ 25.11	$ 5,021.30
6 in Ductile Iron	$ 40.12	$ 166,884.18	$ 41.04	$ 170,722.52	$ 41.98	$ 174,649.14	$ 42.95	$ 178,666.07	$ 43.94	$ 182,775.39
8 in Ductile Iron	$ 51.58	$ 29,399.58	$ 52.76	$ 30,075.77	$ 53.98	$ 30,767.52	$ 55.22	$ 31,475.17	$ 56.49	$ 32,199.10
10 in Ductile Iron	$ 74.50	$ 745.02	$ 76.22	$ 762.15	$ 77.97	$ 779.68	$ 79.76	$ 797.62	$ 81.60	$ 815.96
12 in Ductile Iron	$ 85.96	$ 272,504.91	$ 87.94	$ 278,772.52	$ 89.96	$ 285,184.29	$ 92.03	$ 291,743.53	$ 94.15	$ 298,453.63
14 in Ductile Iron	$ 114.62	$ 173,073.57	$ 117.25	$ 177,054.26	$ 119.95	$ 181,126.51	$ 122.71	$ 185,292.42	$ 125.53	$ 189,554.14
16 in Ductile Iron	$ 154.73	$ 7,736.73	$ 158.29	$ 7,914.68	$ 161.93	$ 8,096.71	$ 165.66	$ 8,282.94	$ 169.47	$ 8,473.45
20 in Ductile Iron	$ 229.24	$ 2,292.37	$ 234.51	$ 2,345.09	$ 239.90	$ 2,399.03	$ 245.42	$ 2,454.20	$ 251.07	$ 2,510.65
3 in Galvanized Iron	$ 17.19	$ 1,203.49	$ 17.59	$ 1,231.17	$ 17.99	$ 1,259.49	$ 18.41	$ 1,288.46	$ 18.83	$ 1,318.09
Totals		$ 693,612.39		$ 709,565.47		$ 725,885.48		$ 742,580.84		$ 759,660.20

Table 56. 10 Year Cost Estimate of Plastic Pipe Replacement

Component	Unit	Length (LF)	Replacement per Year (10 Year Period) (Pipe Only)	2025 Unit Price Cost	2036		2037		2038		2039		2040	
					Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost
1 in PE	LF	400	40	$ 7.50	$ 9.63	$ 385.26	$ 9.85	$ 394.12	$ 10.08	$ 403.19	$ 10.31	$ 412.46	$ 10.55	$ 421.94
2 in PE	LF	100	10	$ 10.00	$ 12.84	$ 128.42	$ 13.14	$ 131.37	$ 13.44	$ 134.40	$ 13.75	$ 137.49	$ 14.06	$ 140.65
1 in PVC	LF	300	30	$ 7.50	$ 9.63	$ 288.94	$ 9.85	$ 295.59	$ 10.08	$ 302.39	$ 10.31	$ 309.34	$ 10.55	$ 316.46
2 in PVC	LF	1000	100	$ 10.00	$ 12.84	$ 1,284.20	$ 13.14	$ 1,313.73	$ 13.44	$ 1,343.95	$ 13.75	$ 1,374.86	$ 14.06	$ 1,406.48
3 in PVC	LF	1900	190	$ 15.00	$ 19.26	$ 3,659.96	$ 19.71	$ 3,744.14	$ 20.16	$ 3,830.26	$ 20.62	$ 3,918.35	$ 21.10	$ 4,008.48
4 in PVC	LF	600	60	$ 20.00	$ 25.68	$ 1,541.04	$ 26.27	$ 1,576.48	$ 26.88	$ 1,612.74	$ 27.50	$ 1,649.83	$ 28.13	$ 1,687.78
6 in PVC	LF	45000	4500	$ 35.00	$ 44.95	$ 202,261.18	$ 45.98	$ 206,913.18	$ 47.04	$ 211,672.19	$ 48.12	$ 216,540.65	$ 49.23	$ 221,521.08
8 in PVC	LF	104200	10420	$ 45.00	$ 57.79	$ 602,160.42	$ 59.12	$ 616,010.11	$ 60.48	$ 630,178.34	$ 61.87	$ 644,672.44	$ 63.29	$ 659,499.91
10 in PVC	LF	6800	680	$ 65.00	$ 83.47	$ 56,761.55	$ 85.39	$ 58,067.06	$ 87.36	$ 59,402.61	$ 89.37	$ 60,768.87	$ 91.42	$ 62,166.55
12 in PVC	LF	64400	6440	$ 75.00	$ 96.31	$ 620,267.61	$ 98.53	$ 634,533.76	$ 100.80	$ 649,128.04	$ 103.11	$ 664,057.98	$ 105.49	$ 679,331.32
14 in PVC	LF	800	80	$ 100.00	$ 128.42	$ 10,273.58	$ 131.37	$ 10,509.88	$ 134.40	$ 10,751.60	$ 137.49	$ 10,998.89	$ 140.65	$ 11,251.86
16 in PVC	LF	189700	18970	$ 135.00	$ 173.37	$ 3,288,766.73	$ 177.35	$ 3,364,408.36	$ 181.43	$ 3,441,789.76	$ 185.61	$ 3,520,950.92	$ 189.88	$ 3,601,932.79
20 in PVC	LF	5900	590	$ 200.00	$ 256.84	$ 151,535.36	$ 262.75	$ 155,020.67	$ 268.79	$ 158,586.15	$ 274.97	$ 162,233.63	$ 281.30	$ 165,965.00
8 in Steel	LF	100	10	$ 45.00	$ 57.79	$ 577.89	$ 59.12	$ 591.18	$ 60.48	$ 604.78	$ 61.87	$ 618.69	$ 63.29	$ 632.92
14 in Steel	LF	500	50	$ 100.00	$ 128.42	$ 6,420.99	$ 131.37	$ 6,568.67	$ 134.40	$ 6,719.75	$ 137.49	$ 6,874.31	$ 140.65	$ 7,032.42
Totals						$ 4,946,313.12		$ 5,060,078.32		$ 5,176,460.13		$ 5,295,518.71		$ 5,417,315.64

Component	2041		2042		2043		2044		2045	
	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost
1 in PE	$ 10.79	$ 431.65	$ 11.04	$ 441.58	$ 11.29	$ 451.73	$ 11.55	$ 462.12	$ 11.82	$ 472.75
2 in PE	$ 14.39	$ 143.88	$ 14.72	$ 147.19	$ 15.06	$ 150.58	$ 15.40	$ 154.04	$ 15.76	$ 157.58
1 in PVC	$ 10.79	$ 323.74	$ 11.04	$ 331.18	$ 11.29	$ 338.80	$ 11.55	$ 346.59	$ 11.82	$ 354.56
2 in PVC	$ 14.39	$ 1,438.83	$ 14.72	$ 1,471.93	$ 15.06	$ 1,505.78	$ 15.40	$ 1,540.41	$ 15.76	$ 1,575.84
3 in PVC	$ 21.58	$ 4,100.67	$ 22.08	$ 4,194.99	$ 22.59	$ 4,291.47	$ 23.11	$ 4,390.18	$ 23.64	$ 4,491.15
4 in PVC	$ 28.78	$ 1,726.60	$ 29.44	$ 1,766.31	$ 30.12	$ 1,806.94	$ 30.81	$ 1,848.50	$ 31.52	$ 1,891.01
6 in PVC	$ 50.36	$ 226,616.07	$ 51.52	$ 231,828.24	$ 52.70	$ 237,160.29	$ 53.91	$ 242,614.97	$ 55.15	$ 248,195.12
8 in PVC	$ 64.75	$ 674,668.40	$ 66.24	$ 690,185.78	$ 67.76	$ 706,060.05	$ 69.32	$ 722,299.43	$ 70.91	$ 738,912.32
10 in PVC	$ 93.52	$ 63,596.38	$ 95.68	$ 65,059.10	$ 97.88	$ 66,555.46	$ 100.13	$ 68,086.23	$ 102.43	$ 69,652.22
12 in PVC	$ 107.91	$ 694,955.94	$ 110.39	$ 710,939.92	$ 112.93	$ 727,291.54	$ 115.53	$ 744,019.25	$ 118.19	$ 761,131.69
14 in PVC	$ 143.88	$ 11,510.66	$ 147.19	$ 11,775.40	$ 150.58	$ 12,046.24	$ 154.04	$ 12,323.30	$ 157.58	$ 12,606.74
16 in PVC	$ 194.24	$ 3,684,777.25	$ 198.71	$ 3,769,527.12	$ 203.28	$ 3,856,226.25	$ 207.96	$ 3,944,919.45	$ 212.74	$ 4,035,652.60
20 in PVC	$ 287.77	$ 169,782.20	$ 294.39	$ 173,687.19	$ 301.16	$ 177,681.99	$ 308.08	$ 181,768.68	$ 315.17	$ 185,949.36
8 in Steel	$ 64.75	$ 647.47	$ 66.24	$ 662.37	$ 67.76	$ 677.60	$ 69.32	$ 693.19	$ 70.91	$ 709.13
14 in Steel	$ 143.88	$ 7,194.16	$ 147.19	$ 7,359.63	$ 150.58	$ 7,528.90	$ 154.04	$ 7,702.06	$ 157.58	$ 7,879.21
Totals		$ 5,541,913.90		$ 5,669,377.92		$ 5,799,773.61		$ 5,933,168.40		$ 6,069,631.28

Table 57. Potential Replacement Costs of Major Elements in City of Douglas Water System

	2025 Unit Cost	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Booster Pump 1 Chalk Buttes	$ 5,000.00	$ 5,115.00	$ 5,232.65	$ 5,353.00	$ 5,476.11	$ 5,602.07	$ 5,730.91	$ 5,862.72	$ 5,997.57	$ 6,135.51	$ 6,276.63	$ 6,420.99	$ 6,568.67	$ 6,719.75
Booster Pump 2 Chalk Buttes	$ 5,000.00	$ 5,115.00	$ 5,232.65	$ 5,353.00	$ 5,476.11	$ 5,602.07	$ 5,730.91	$ 5,862.72	$ 5,997.57	$ 6,135.51	$ 6,276.63	$ 6,420.99	$ 6,568.67	$ 6,719.75
PRV Chalk Buttes	$ 11,000.00	$ 11,253.00	$ 11,511.82	$ 11,776.59	$ 12,047.45	$ 12,324.54	$ 12,608.01	$ 12,897.99	$ 13,194.65	$ 13,498.12	$ 13,808.58	$ 14,126.18	$ 14,451.08	$ 14,783.45
Booster Pump 1 Clearfield	$ 3,000.00	$ 3,069.00	$ 3,139.59	$ 3,211.80	$ 3,285.67	$ 3,361.24	$ 3,438.55	$ 3,517.63	$ 3,598.54	$ 3,681.31	$ 3,765.98	$ 3,852.59	$ 3,941.20	$ 4,031.85
Booster Pump 2 Clearfield	$ 8,000.00	$ 8,184.00	$ 8,372.23	$ 8,564.79	$ 8,761.78	$ 8,963.30	$ 9,169.46	$ 9,380.36	$ 9,596.11	$ 9,816.82	$ 10,042.60	$ 10,273.58	$ 10,509.88	$ 10,751.60
Booster Pump 3 Clearfield	$ 3,000.00	$ 3,069.00	$ 3,139.59	$ 3,211.80	$ 3,285.67	$ 3,361.24	$ 3,438.55	$ 3,517.63	$ 3,598.54	$ 3,681.31	$ 3,765.98	$ 3,852.59	$ 3,941.20	$ 4,031.85
Booster Pump 1 WLEA	$ 3,000.00	$ 3,069.00	$ 3,139.59	$ 3,211.80	$ 3,285.67	$ 3,361.24	$ 3,438.55	$ 3,517.63	$ 3,598.54	$ 3,681.31	$ 3,765.98	$ 3,852.59	$ 3,941.20	$ 4,031.85
Booster Pump 2 WLEA	$ 3,000.00	$ 3,069.00	$ 3,139.59	$ 3,211.80	$ 3,285.67	$ 3,361.24	$ 3,438.55	$ 3,517.63	$ 3,598.54	$ 3,681.31	$ 3,765.98	$ 3,852.59	$ 3,941.20	$ 4,031.85
Booster Pump 3 WLEA	$ 3,000.00	$ 3,069.00	$ 3,139.59	$ 3,211.80	$ 3,285.67	$ 3,361.24	$ 3,438.55	$ 3,517.63	$ 3,598.54	$ 3,681.31	$ 3,765.98	$ 3,852.59	$ 3,941.20	$ 4,031.85
Booster Pump 4 WLEA	$ 50,000.00	$ 51,150.00	$ 52,326.45	$ 53,529.96	$ 54,761.15	$ 56,020.65	$ 57,309.13	$ 58,627.24	$ 59,975.67	$ 61,355.11	$ 62,766.27	$ 64,209.90	$ 65,686.72	$ 67,197.52
PRV 1 WLEA	$ 10,000.00	$ 10,230.00	$ 10,465.29	$ 10,705.99	$ 10,952.23	$ 11,204.13	$ 11,461.83	$ 11,725.45	$ 11,995.13	$ 12,271.02	$ 12,553.25	$ 12,841.98	$ 13,137.34	$ 13,439.50
PRV 2 WLEA	$ 4,750.00	$ 4,859.25	$ 4,971.01	$ 5,085.35	$ 5,202.31	$ 5,321.96	$ 5,444.37	$ 5,569.59	$ 5,697.69	$ 5,828.74	$ 5,962.80	$ 6,099.94	$ 6,240.24	$ 6,383.76
PRV 3 WLEA	$ 4,750.00	$ 4,859.25	$ 4,971.01	$ 5,085.35	$ 5,202.31	$ 5,321.96	$ 5,444.37	$ 5,569.59	$ 5,697.69	$ 5,828.74	$ 5,962.80	$ 6,099.94	$ 6,240.24	$ 6,383.76
PRV 4 WLEA	$ 2,000.00	$ 2,046.00	$ 2,093.06	$ 2,141.20	$ 2,190.45	$ 2,240.83	$ 2,292.37	$ 2,345.09	$ 2,399.03	$ 2,454.20	$ 2,510.65	$ 2,568.40	$ 2,627.47	$ 2,687.90

	2039	2040	2041	2042	2043	2044	2045
Booster Pump 1 Chalk Buttes	$ 6,874.31	$ 7,032.42	$ 7,194.16	$ 7,359.63	$ 7,528.90	$ 7,702.06	$ 7,879.21
Booster Pump 2 Chalk Buttes	$ 6,874.31	$ 7,032.42	$ 7,194.16	$ 7,359.63	$ 7,528.90	$ 7,702.06	$ 7,879.21
PRV Chalk Buttes	$ 15,123.47	$ 15,471.31	$ 15,827.15	$ 16,191.18	$ 16,563.58	$ 16,944.54	$ 17,334.26
Booster Pump 1 Clearfield	$ 4,124.58	$ 4,219.45	$ 4,316.50	$ 4,415.78	$ 4,517.34	$ 4,621.24	$ 4,727.53
Booster Pump 2 Clearfield	$ 10,998.89	$ 11,251.86	$ 11,510.66	$ 11,775.40	$ 12,046.24	$ 12,323.30	$ 12,606.74
Booster Pump 3 Clearfield	$ 4,124.58	$ 4,219.45	$ 4,316.50	$ 4,415.78	$ 4,517.34	$ 4,621.24	$ 4,727.53
Booster Pump 1 WLEA	$ 4,124.58	$ 4,219.45	$ 4,316.50	$ 4,415.78	$ 4,517.34	$ 4,621.24	$ 4,727.53
Booster Pump 2 WLEA	$ 4,124.58	$ 4,219.45	$ 4,316.50	$ 4,415.78	$ 4,517.34	$ 4,621.24	$ 4,727.53
Booster Pump 3 WLEA	$ 4,124.58	$ 4,219.45	$ 4,316.50	$ 4,415.78	$ 4,517.34	$ 4,621.24	$ 4,727.53
Booster Pump 4 WLEA	$ 68,743.06	$ 70,324.15	$ 71,941.61	$ 73,596.27	$ 75,288.98	$ 77,020.63	$ 78,792.10
PRV 1 WLEA	$ 13,748.61	$ 14,064.83	$ 14,388.32	$ 14,719.25	$ 15,057.80	$ 15,404.13	$ 15,758.42
PRV 2 WLEA	$ 6,530.59	$ 6,680.79	$ 6,834.45	$ 6,991.65	$ 7,152.45	$ 7,316.96	$ 7,485.25
PRV 3 WLEA	$ 6,530.59	$ 6,680.79	$ 6,834.45	$ 6,991.65	$ 7,152.45	$ 7,316.96	$ 7,485.25
PRV 4 WLEA	$ 2,749.72	$ 2,812.97	$ 2,877.66	$ 2,943.85	$ 3,011.56	$ 3,080.83	$ 3,151.68

These schedules will allow Douglas to address potential deficits in the water system as a whole and plan for costs in the future. In addition to the costing schedules provided above, potential project discussions outside of the leak detection results were discussed with HDR, CEPI, and the City of Douglas. Below are the projects that have been added to the master planning recommendations (Section 9.0).

8.0 Hydraulic Modeling

The existing hydraulic model of the City of Douglas water distribution system was updated and calibrated as part of the master plan. The development of the hydraulic water model included incorporation the updated water system infrastructure, evaluation and assignment of demands throughout the system, and the calibration of the model. Recent system improvements and additions were added to the model to reflect the current state of the system. The calibration was completed utilizing steady state conditions to verify model pipe network connectivity, pipe diameters, and pipe friction factors.

8.1 Model Overview

The City of Douglas hydraulic model was developed using Bentley's WaterCAD software. The model incorporates the City's water system infrastructure, including all water mains, storage tanks, pumps, and isolation valves. CEPI worked with city staff to verify and update pipe diameters, materials, and the approximate locations of existing water mains. Checks were conducted on the model to ensure proper pipe network connectivity, as well as the accurate setup of tanks and pump stations. These efforts enable the model to reliably evaluate system pressures, transmission pipeline flows, fire flows, water storage tank balancing, water age, and overall system operations through steady state and extended period simulations.

8.2 Demand Allocation

Water system demands were assigned to individual nodes in the hydraulic model using the City of Douglas' water billing records and the latest address GIS shapefile. Billing data from both January and August 2022, 2023, and 2024 were analyzed to calculate average demands for each address over the three-year period for January and August.

After formatting and processing the data, water demands were spatially assigned in GIS by matching billing record addresses to those in the latest shapefile. A new shapefile was then created, linking each address to its corresponding demand for both January and August. For addresses with multiple meters, such as apartment complexes or irrigation meters, additional demand points were inserted. Addresses without billing records were assigned a demand of zero. The finalized demand data was then integrated into the hydraulic model by linking the January and August demand shapefiles to the nearest pipe, which in turn assigned the demands to the nearest node. Verification checks of the billing records, shapefiles, and the water model ensured both the completeness and accuracy of the data throughout the process. With the demands incorporated, global adjustments were applied to those

demands to create different scenarios. The historical water production data shown below in Figure 31 and Figure 32 were utilized to find the adjustment factors.

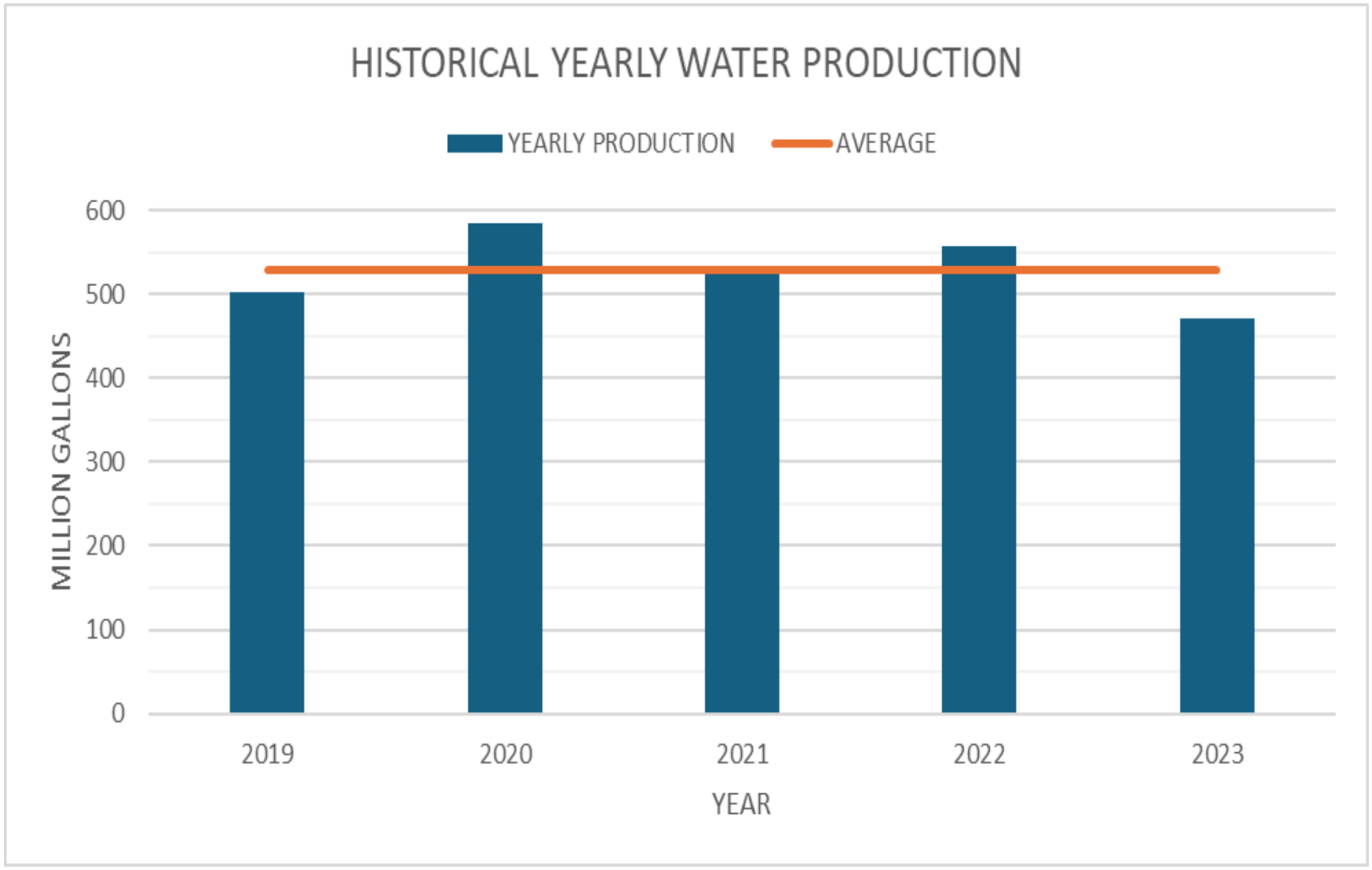


Figure 31. Historical Yearly Production

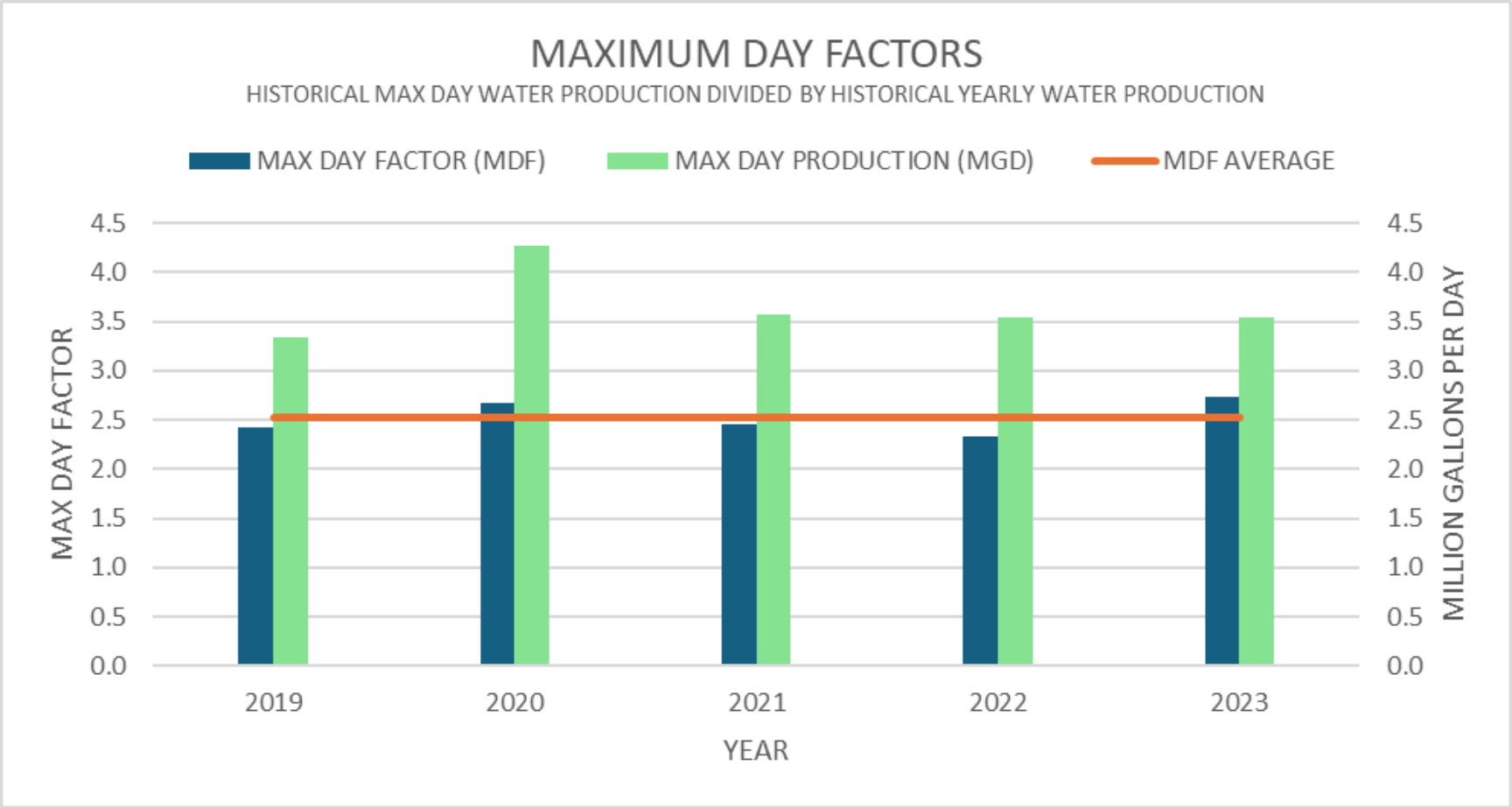


Figure 32. Historical Max Day Factors

A global factor was applied to the Average Day Demand (ADD) Scenario, setting the average day demand at 1.45 MGD, or 1,006.82 GPM, using August data. The Maximum Day Demand (MDD) Scenario was then calculated by multiplying the ADD by a factor of 2.5. Both the Average and Maximum Day Demands are based on water production records from 2019 to 2023. To determine the Peak Hour Demand (PHD) Scenario, a Peak Hour Factor (PHF) of 1.8, derived from the highest identified peak in the Summer Diurnal Curve, was applied to the MDD, resulting in a PHD equivalent to 4.5 times the ADD. A global adjustment was made accordingly. Additionally, a winter demands scenario was incorporated using January demands. Analysis of average winter and summer demands indicated that winter demands should be set at 65% of the ADD Scenario according to global adjustment.

8.3 Diurnal Demand

Diurnal demands illustrate the fluctuations in water usage throughout the day, reflecting variations driven by customer activities and usage patterns. These fluctuations result in higher water demand during certain times of the day, particularly in the summer when irrigation increases both morning and evening consumption. To capture these variations, diurnal curves were developed for both the summer and winter by using SCADA records from selected days in each season. These records provided one-minute interval data on tank levels and flow rates from the Springline, Sheep Mountain Well, and the WTP.

The resulting summer and winter diurnal curves are shown below in Figure 33 and Figure 34. The blue and gray lines represent the percentage of daily demand for specific days within each season, while the red line averages these values. A simplified regression of the raw data is shown as a smooth, thick orange line, which was incorporated into the WaterCAD model and assigned to seasonal demands accordingly. The summer diurnal is utilized for the ADD and MDD Extended Period Simulation models (EPS), while the winter diurnal is utilized for the winter EPS.

8.4 Extended Period Simulation

Extended Period Simulation (EPS) models were developed for the MDD scenario and winter demands scenario. The summer diurnal was utilized for the MDD EPS model, while the winter diurnal was utilized for the winter demands EPS model. The water system operations and controls were verified with city staff and incorporated in the EPS simulations. The water system operations and controls include pump station operations and set points, accurate tank dimensions, flow control structure operations, and pressure reducing valve operations. The MDD EPS and winter demands EPS provide a reliable tool for analyzing the water system operation for a specific time period covering all demand and operation scenarios.

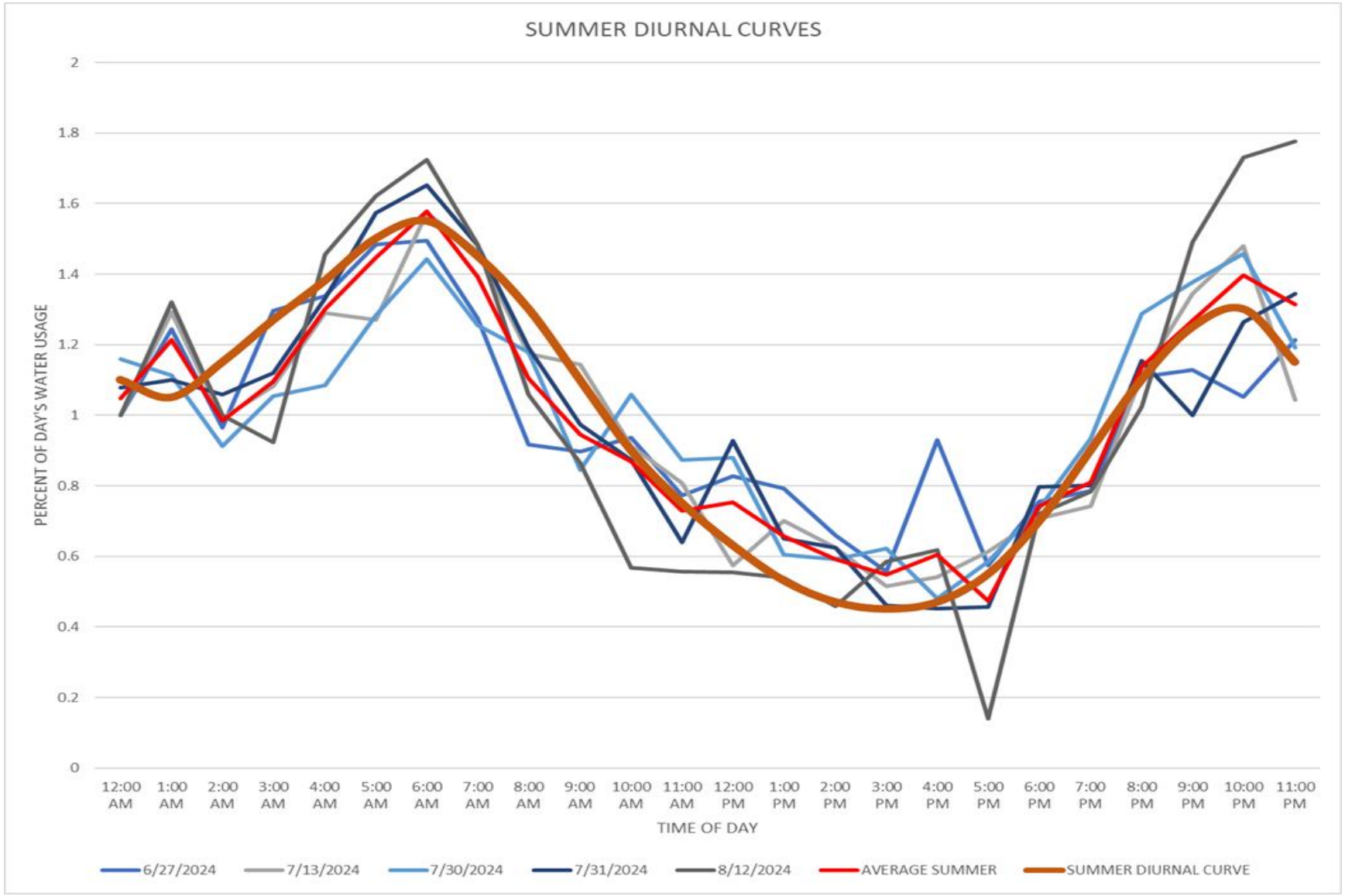


Figure 33. Summer Diurnal Curve

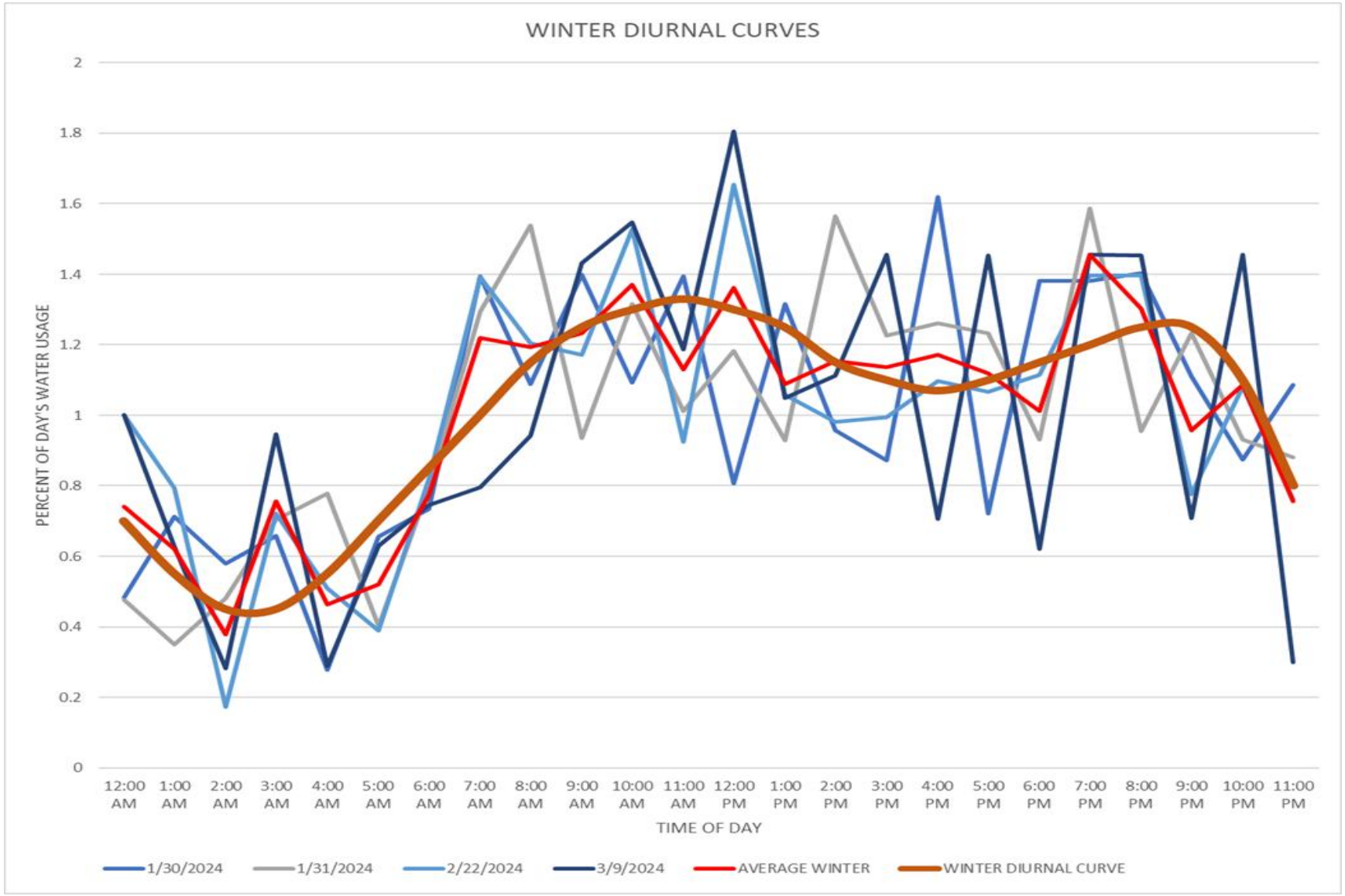


Figure 34. Winter Diurnal Curve

8.5 Calibration

The 2024 City of Douglas hydraulic model was calibrated using two methods: static and dynamic calibration.

For the calibration efforts, seven locations were selected for testing. The testing locations were spread throughout the distribution system to ensure each section of the model is represented. The seven test locations are displayed on Figure 35.

Static calibration ensured the accuracy of node elevations and system configuration by comparing measured and modeled static pressures.

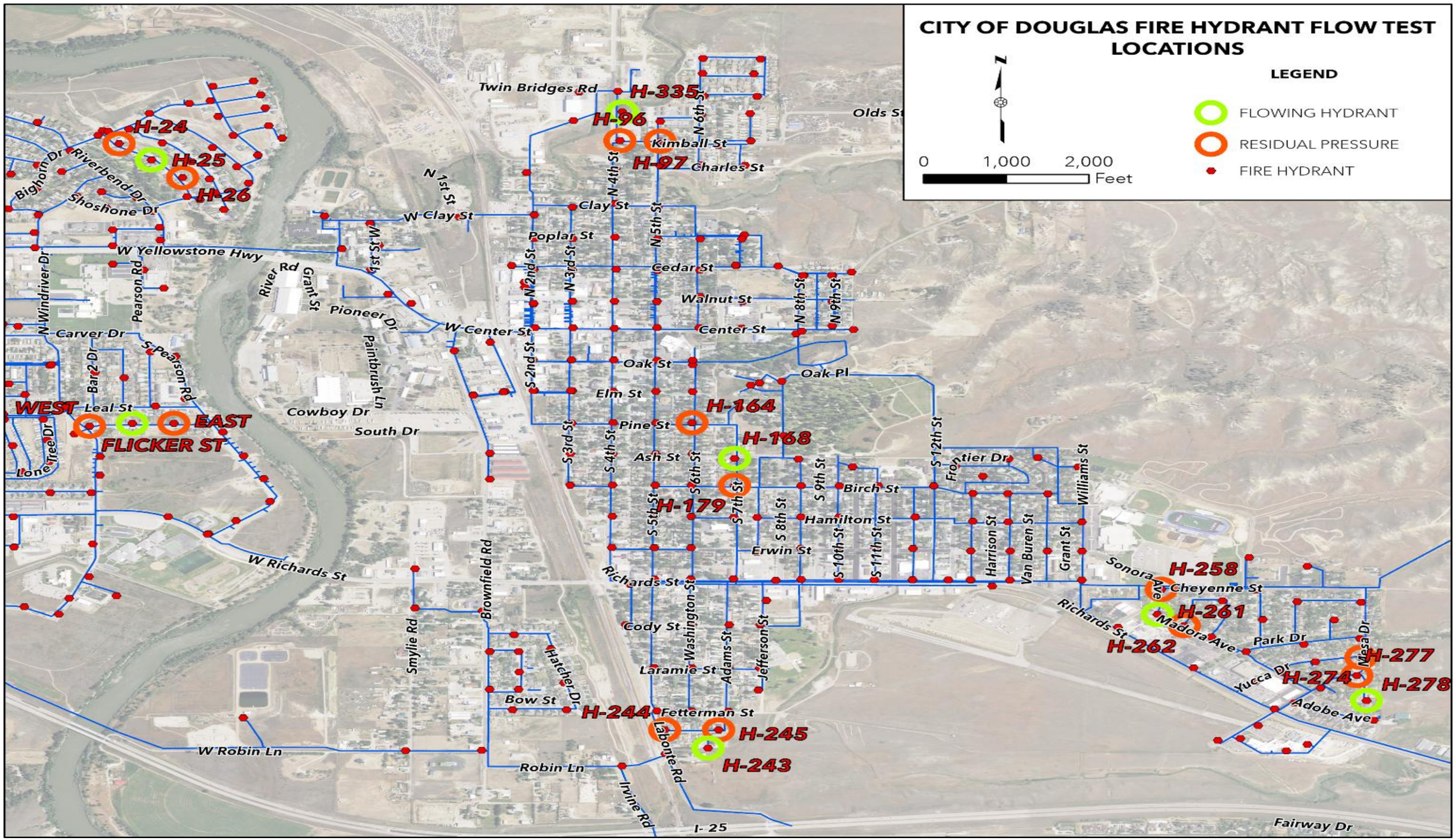


Figure 35. Hydrant Flow Test Location Map

During testing, SCADA data on tank levels was provided by the City of Douglas to reflect real-time system conditions. The hydraulic model was then adjusted to match the system configuration for each test, allowing direct comparisons between modeled and measured pressures for the duration of the hydrant flow test. Initial static calibration efforts revealed a consistent discrepancy between pressure logger readings and model results. To address this, the pressure loggers were sent to their manufacturer for calibration. Once calibrated, static pressure was remeasured at each test location where it was determined that prior to recalibration, the pressure loggers had been underreporting by 5.5 PSI and 6.5 PSI, respectively. The originally collected data was adjusted to account for these discrepancies. The final calibration results shown in Table 58 confirmed the model's accuracy, demonstrating that the modeled results were within at least 10% of the measured value for all tests, with modeled static pressures consistently falling within 2 PSI of measured values--most differing by no more than 1 PSI.

Table 58. Static Calibration Results

Test Number	Hydrant	Measured Pressure (PSI)	Modeled Pressure (PSI)
Flow Test 1	H-26	70	69.5
	H-24	65.6	65.1
Flow Test 2	EAST	88.3	88.8
	WEST	83	83.2
Flow Test 3	H-97	81.1	81.5
	H-96	84	84.8
Flow Test 4	H-179	69.9	70
	H-164	74.4	72.9
Flow Test 5	H-244	76.4	76.5
	H-245	77.1	77.4
Flow Test 6	H-262	62.1	60.7
	H-258	59.8	57.6
Flow Test 7	H-277	64.9	63.3
	H-274	70	69.7

The dynamic calibration was conducted to determine friction losses in waterlines and to verify system connectivity and pipe diameters. This process involved fire

hydrant flushing tests at the seven test locations, where, while a fire hydrant was flushed, pressure and flow rates were recorded at that hydrant and at adjacent hydrants. The results of this demonstrated that the modeled dynamic pressures were consistently within 2 PSI of the measured values, validating the model's accuracy. For the dynamic calibration efforts, the modeled pressures are calculated in a steady state scenario without accounting for pressure transients throughout the system. The measured pressures are continuously recording the system pressure and display the pressure transients throughout this process. The goal for calibration efforts is for the steady state pressures in the model to closely match the steady state pressure loggers for the given flow rate. The modeled and measured results are shown in Figure 36 through Figure 42 below.

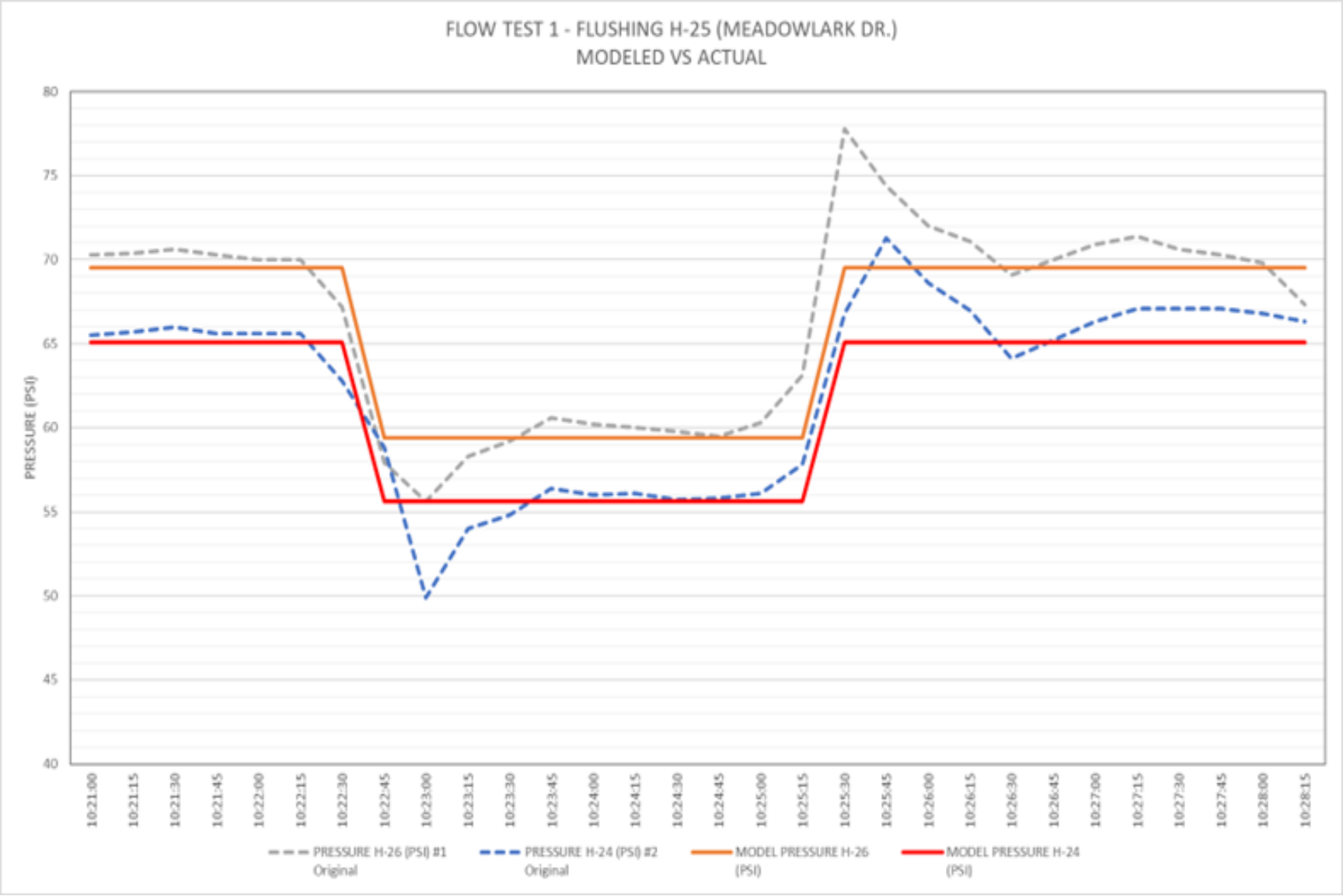


Figure 36. Flow Test 1

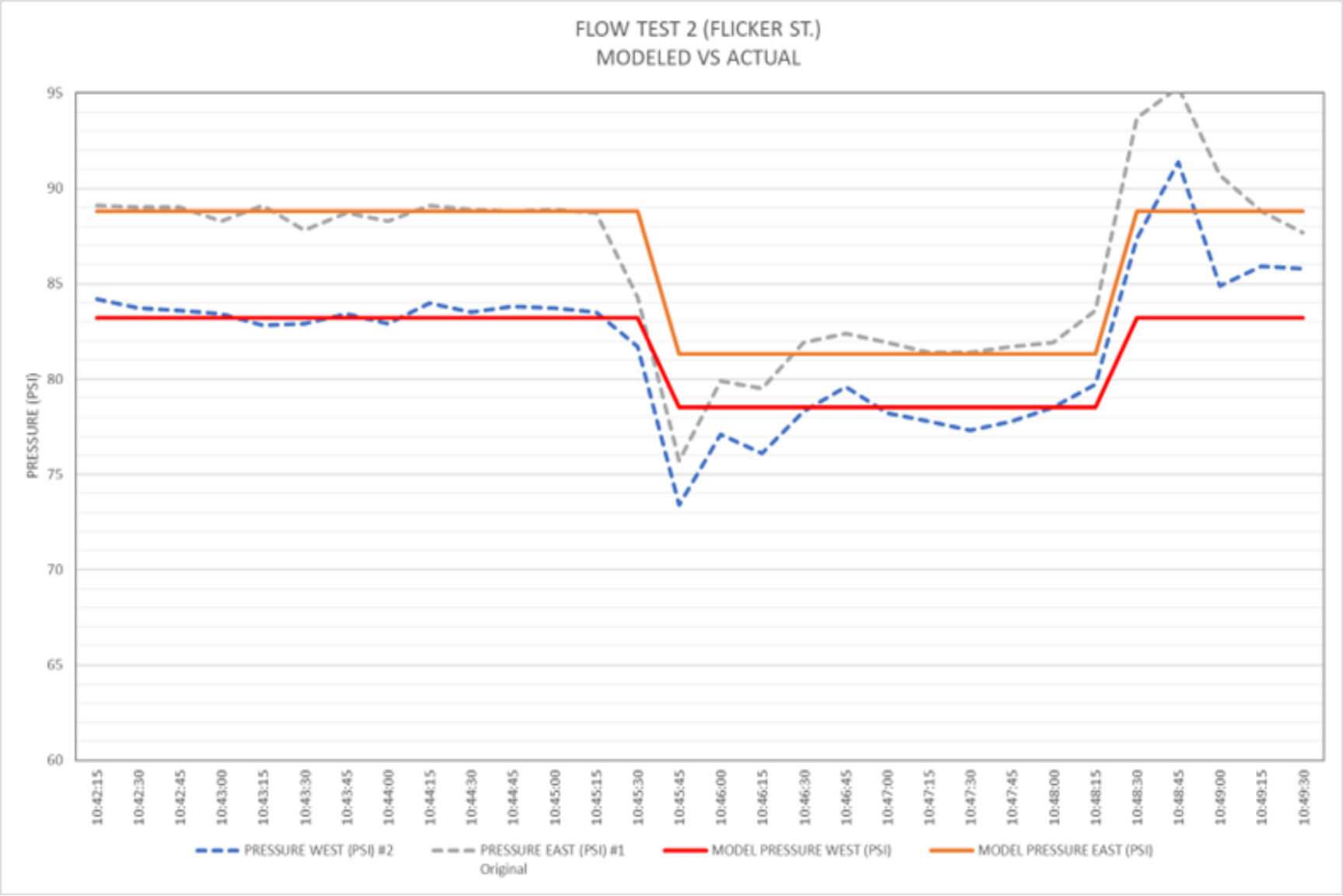


Figure 37. Flow Test 2

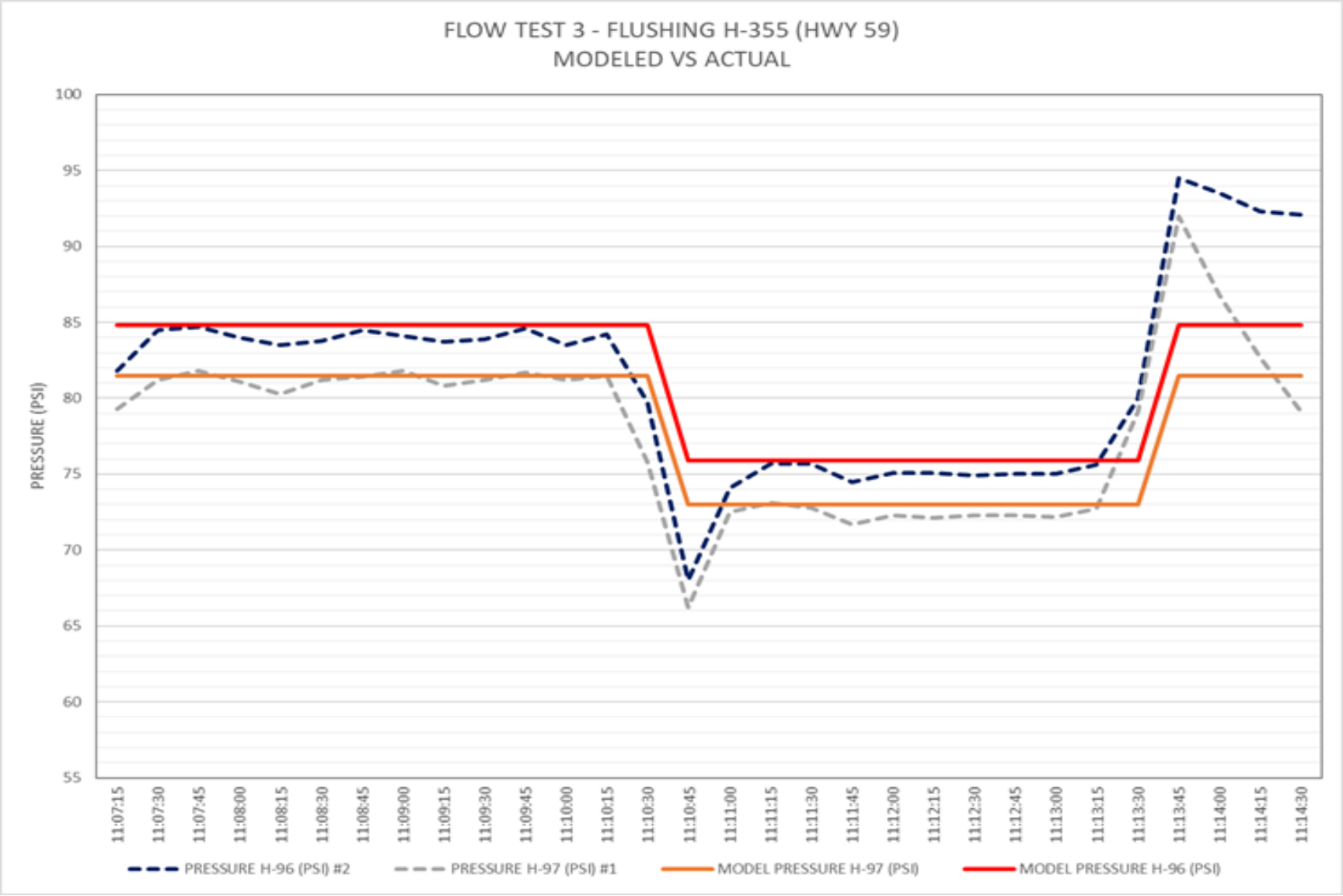


Figure 38. Flow Test 3

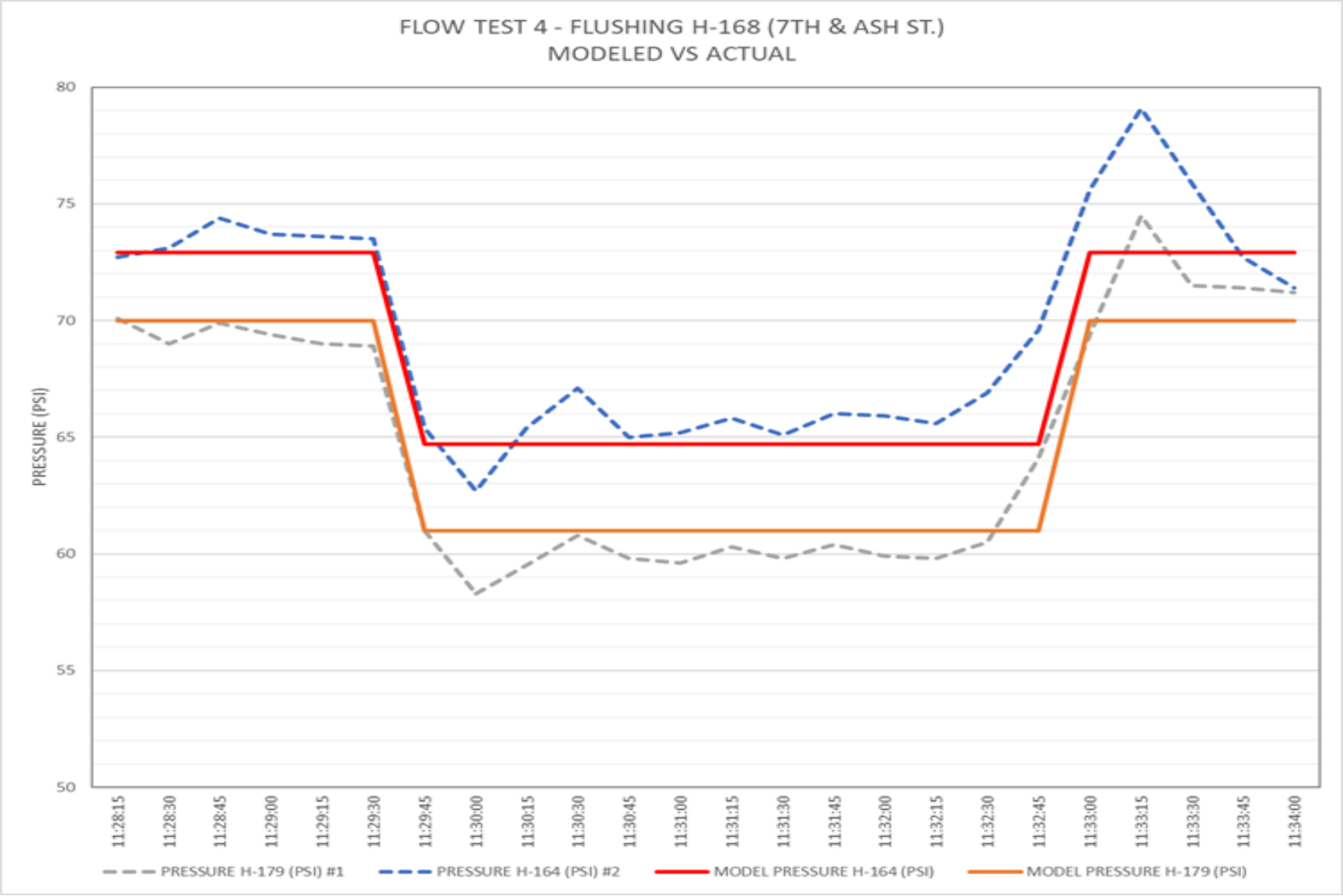


Figure 39. Flow Test 4

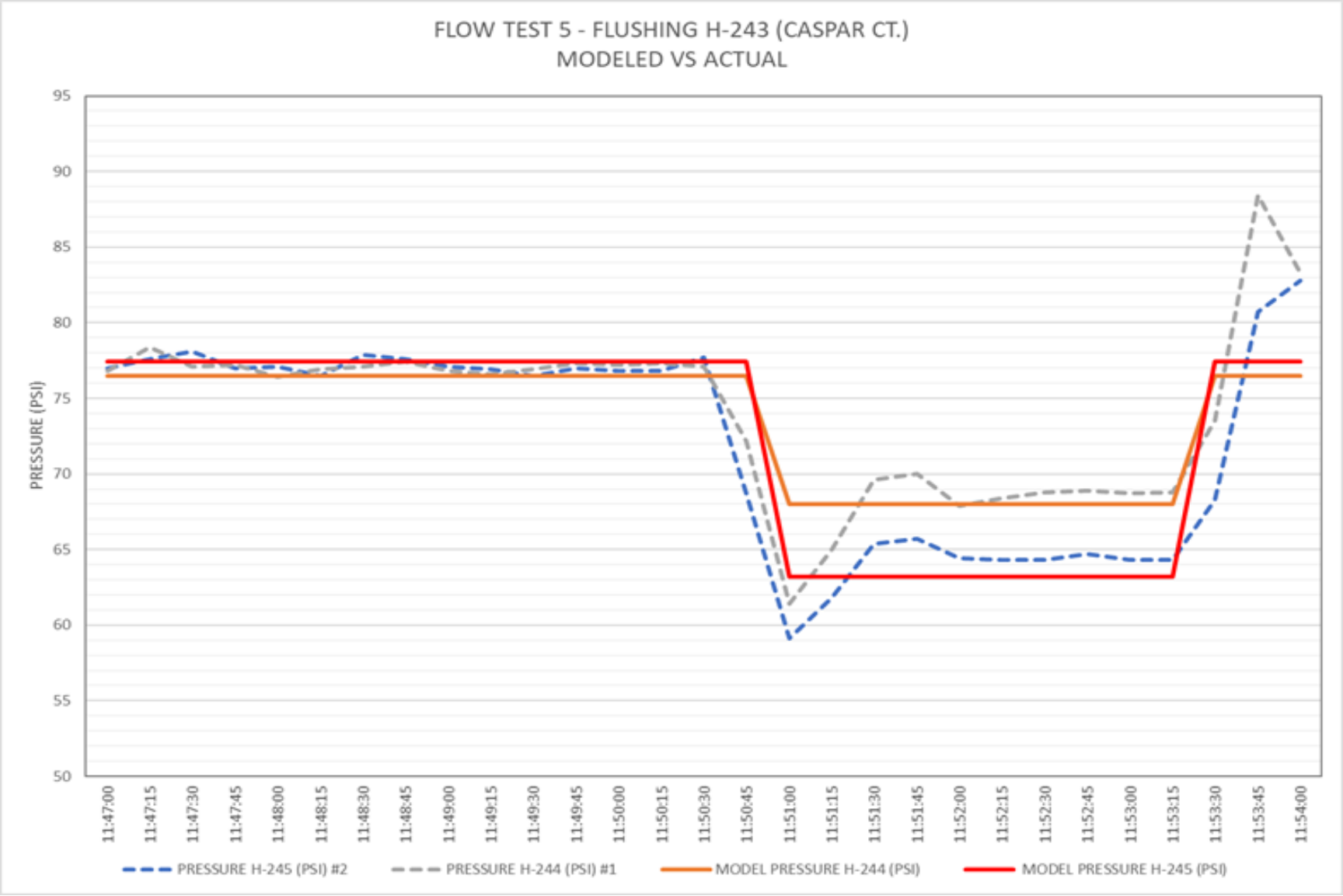


Figure 40. Flow Test 5

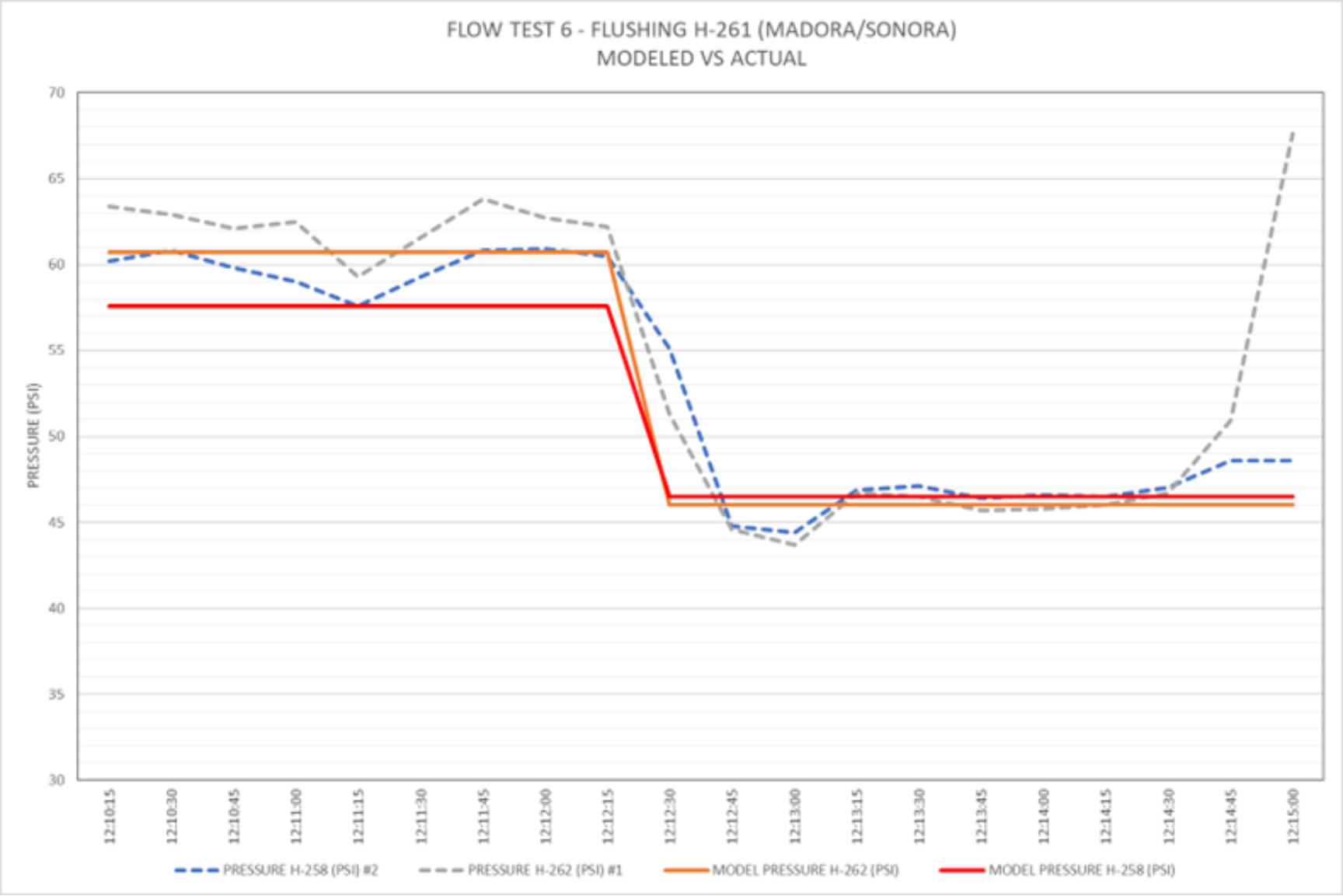


Figure 41. Flow Test 6

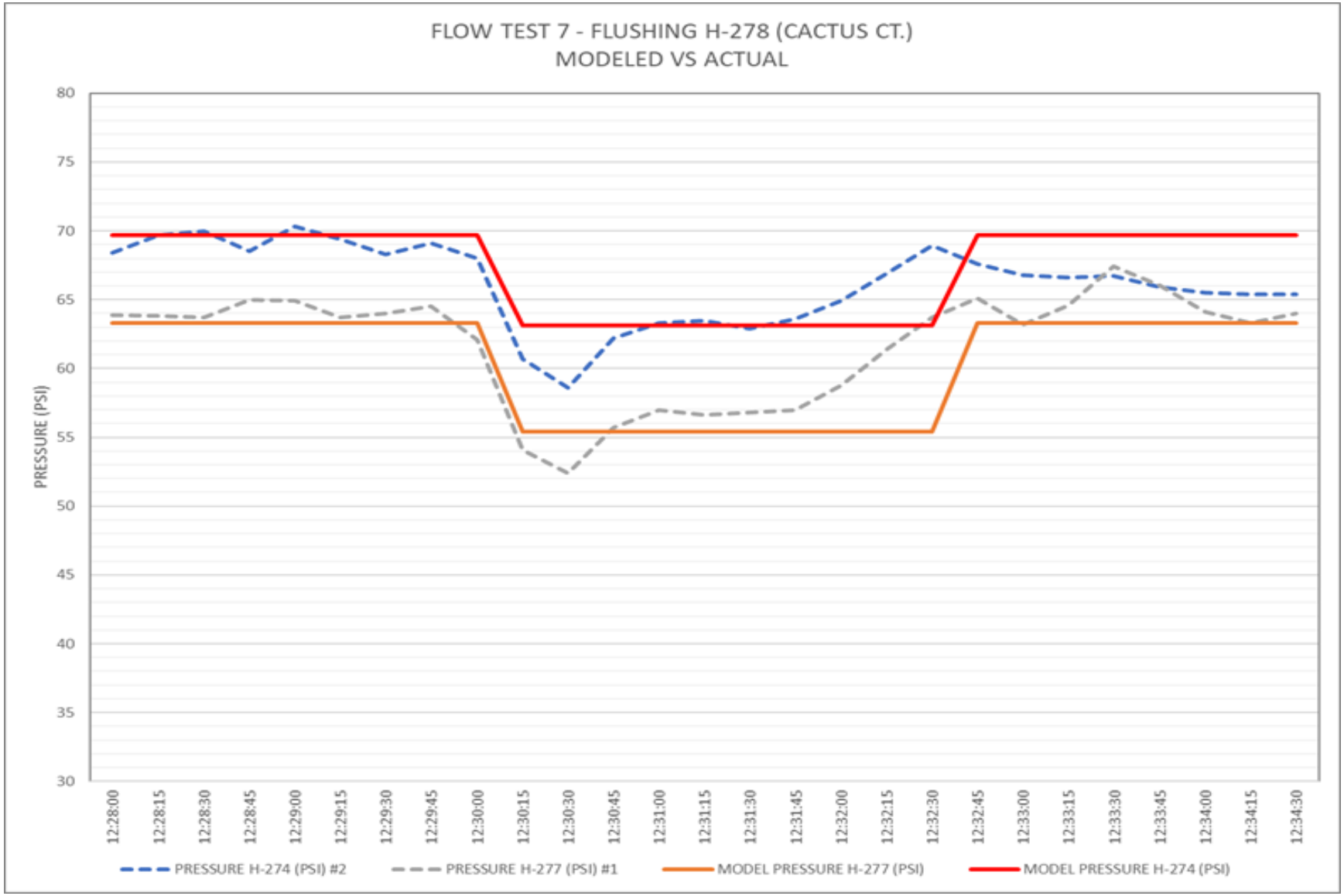


Figure 42. Flow Test 7

8.6 Hydraulic Model Update Summary

The updates in calibration efforts to the existing hydraulic model included incorporating recent system improvements, verifying pipe sizes and materials, and assigning updated system demands using billing data from 2022 to 2024. MDD, PHD, ADD and winter demand scenarios were developed using historical production data, with global adjustment factors applied to each. Diurnal curves were created from SCADA data to capture daily demand fluctuations in both the summer and winter and were applied to the extended period simulations. Steady-state calibration was performed using both static and dynamic methods at seven locations across the system. Adjustments were made to the modeled system connectivity to reflect real-world conditions. The final results demonstrated that modeled pressures were consistently within 2-3 PSI of measured values, confirming the model's accuracy and reliability.

9.0 Master Planning Recommendations

This section provides recommendations that the City of Douglas should consider to improve the overall quality, delivery, and supply of the system. Below is Table 59, which breaks down the recommendations within the report.

Table 59. Master Planning Recommendations

Recommendation	Project Category	Section	Description
Enlargement of Current Rights	Non-Capital	6.2	The City could file with Wyoming SEO a present-day priority enlargement application for municipal use and add the WTP intake as an alternate point of diversion for the original water rights
Aquifer Monitoring	Non-Capital	4.3	Recommend collecting additional baseline monitoring of the Paleozoic Aquifers
Evapotranspiration Study	Non-Capital	4.6	Consider an independent ET study to obtain numbers more reflective of the City of Douglas itself
SEO Connectivity Discussion	Non-Capital	4.3	Discuss Connectivity of Groundwater Source (SMW) with SEO
Inner City Developments	Non-Capital	1.5	The City of Douglas is planning to expand with major developments. They should carefully consider the additional water needed to provide for these expansions
Cemetery Tank 2	Storage Considerations	7.3	New tank at a different site could be implemented to service a new pressure zone
Relining of Orpha Tank	Storage Considerations	7.3	As Orpha is nearing 25 year old, it is recommended to reline the tank to ensure a longer lifespan of the tank itself
Cemetery Tank Irrigation Conversion	Storage Considerations	7.3	The current tank could be retrofitted to use as an irrigation reservoir

Recommendation	Project Category	Section	Description
Douglas WTP	Supply Augmentation	4.4	A key step in improving Douglas' water supply availability and use efficiency is to upgrade the WTP to mitigate the clogging issues seen in the slow sand filters
Exploratory Well in Fort Union (Well Only)	Supply Augmentation	6.7	Complete a well test to allow collection of aquifer test and water quality data in Tullock Member
Water Rights Purchases	Supply Augmentation	6.1	The two pathways for purchasing water rights would be "connected" rights within the Platte River Basin or "Green Zone," "unconnected" rights
Storage Water Contracts (Per Year)	Supply Augmentation	6.3	Potential to buy storage water from Pathfinder or Glendo Reservoirs to augment supply during administration
Exploratory Well in Fox Hills (Well Only)	Supply Augmentation	6.7	Evaluate water quantity and water quality in Fox Hills Aquifer
Western Cable Well TL	Supply Augmentation	6.6	Proposal from Western Cable to sell the well to Douglas for $1,550,000, plus continued use of water from the well at a cost of one-half of the normal bulk rate
Richard St. Connect	Water Line Projects	7.8	This project provides a connection on a stretch of road that has no connections along West Richards Street
South River Crossing - I25	Water Line Projects	7.8	A redundant connection in the South of Douglas, connecting the two sides of town would be beneficial to protect the entire city supply if breaks or leaks were to occur
Cemetery to Cheyenne Transmission Line	Water Line Projects	7.8	A line connecting the existing cemetery tank to Cheyenne street would serve two purposes; to connect the tank to a pressure zone it currently does not service and replacement of piping

Recommendation	Project Category	Section	Description
Jefferson Leakage Repair	Water Line Projects	7.7	As in the last project recommendation, the objective of this project is to repair the leak via pipe replacement. In addition, surrounding pipes would also be replaced due to DIP
Cemetery Tank Main Connect	Water Line Projects	7.3	The line connecting the Cemetery tank to the WTP is currently comprised of 6,200 feet of a 14-inch DIP that runs along North 8th Street. It is recommended that this DIP is replaced with PVC pipe to prevent future pipe corrosion and the development of leaks.
Clearfield Transmission Line	Water Line Projects	7.8	This would provide redundant delivery in the event of an emergency shut off in the area.
Birch St Frontier Dr Leakage Repair	Water Line Projects	7.7	As in the last project recommendation, the objective of this project is to repair the leak via replacement. In addition, surrounding pipes would also be replaced due to DIP
7th & Birch St. Leakage Repair	Water Line Projects	7.7	As in the last project recommendation, the objective of this project is to repair the leak via replacement. In addition, all surrounding pipes would also be replaced due to being DIP
S 4th Street Replacement Upgrade to 16"	Water Line Projects	7.8	
Center Street Railroad Crossing Bore WL	Water Line Projects	7.8	
Clearfield Booster to Tank Line DIP Upgrade	Water Line Projects	7.3	

Recommendation	Project Category	Section	Description
N 3rd Street Leakage Repair	Water Line Projects	7.7	Pipes within a two block radii around the leak would be replaced with PVC piping to ensure the longevity of the lines, rather than attempting to combat leaks due to the aging infrastructure

9.1 Project Ranking System

The project ranking system was developed by taking the above recommendations and determining whether these qualified as projects. Once that was established, a system to rank the overall projects against each other was developed. Categories for project ranking included capital costs, complexity, reliability, ease of implementation, and flexibility. Rankings were averaged after each project was individually ranked by the HDR team, CEPI (Nick Larsen), the WWDC project manager (Lonnie Olson), and the City of Douglas (Josh Oberlander/John Sterns). Project rank establishes which projects should be completed first, helping to inform the funding scenarios and cost. These elements will be discussed in Section 10 of the report.

9.2 Cost Estimates

Cost Estimates were developed using the provided WWDC cost estimate template. These determine the eligibility of each project on a per item basis. It should be noted that there are only specific projects and components that are eligible per the WWDC criteria, these include the following:

- Pipelines for conveyance, including pump stations and other appurtenances to facilitate transmission.
- Wells and springs – water sources but not treatment.
- Irrigation works – laterals, canals, and other on farm improvements.
- Pre-construction, planning, and legal assistance for the preparation of final design and specifications as well as permitting for environmental and mitigation.
- Access acquisition and right of way
- Engineering, Construction Management & Contingency – this includes construction engineering and construction contingency.

A typical EOPCC was used as the basis for each of the costs. Each project is broken down into base components in order to best provide a cost estimate for each item. It should be noted that these costs are used only to inform the City on the economic considerations for projects, and do not reflect true costs/quotes from contractors.

Each of these recommendations will be broken down into four categories:

- Non-Capital Projects/Generalized Recommendations
- Storage Considerations
- Water Supply Augmentation
- Water Line Projects (Transmission/Distribution)

The following sections will show the projects in the categories listed above, as well as their locations, projected costs, and project rank. It should be noted that non-capital projects will have no cost associated with them.

9.3 Non-Capital Projects/ Recommendations

9.3.1 Enlargement of Current Rights

PROJECT RANK: 8 (1)

PROJECT NARRATIVE:

To potentially augment the overall water supply of Douglas without purchasing water, it is recommended that the City of Douglas apply for an enlargement of some of their water rights. The enlargement of rights would not be covered under the depletion benchmarks, due to it taking place after the year 1997. Enlargement of rights for the City of Douglas could include rights to the Community Club Sprinkler System (P22594.0D) and rights to the LBES. As stated previously, the City of Douglas could apply for a current day priority enlargement to any rights related to the Community Club sprinkler system. With this application, they could request an alternate point of diversion at the WTP, allowing for more water to be diverted at the plant. This enlargement would come with the understanding that the plant would need to be improved to allow for a higher treatment capacity (See Section 4.3 for operation limitations). Alternatively, records have shown that the LBES can produce higher than currently appropriated volumes. The City could follow the same process above and apply for a current day priority enlargement to the spring, noting that they may face limitations via the transmission line.

9.3.2 Aquifer Monitoring

PROJECT RANK: 19 (2)

PROJECT NARRATIVE:

Due to the assumed connectivity of Sheep Mountain Well No.1 (SMW No. 1) in relation to the NPR, it is recommended that the City of Douglas implement monitoring of other Paleozoic aquifers in the region to determine the true connectivity of the well. Springs and seeps from the Paleozoic are clearly tributary to the NPR, but the total volume of groundwater flowing in deeper zones would bypass the river and likely flow into the Powder River Basin and enter a different and non-tributary groundwater circulation pattern. Monitoring could include the observation of existing wells in the area (for example, Green Valley No. 1 N, Casper-Meyer No. 1, and Little Box Elder Well No. 1) and the conversion of Sheep Mountain No. 2 into a monitor well, applying for funding for additional monitoring wells including a nested well complex adjacent to the NPR. This latter complex would allow the City to determine the depth of the Paleozoic aquifers and the vertical groundwater flow direction in the vicinity of the river. The monitoring program would also include flow measurements from tributary streams/springs to the NPR. These monitoring measures would provide valuable information to the City of Douglas and the Wyoming SEO in any effort to contest the connectivity of the SMW No. 1 or any subsequent production wells within the Paleozoic Groundwater Compartment.

9.3.3 Evapotranspiration Study

PROJECT RANK: 20 (3)

PROJECT NARRATIVE:

The overall purpose of this study would be to determine a more efficient watering plan for the City. An analysis of the evapotranspiration rates in the City of Douglas was done as part of this report (See Section 4.6). These numbers were tabulated from various sources, of which only one was equipped to provide true number estimates within the City. Since these numbers were not collected and rather were modeled, the opportunity to do a true study using measuring equipment to more accurately understand rates within the City was provided as a result. The sites listed within the analysis are good candidates for this type of study due to their large areas of irrigated lands. Once a study is completed, the numbers can be used to determine the best watering practices for individual sites. This would likely reduce strain on the watering system during the summer months but have the added effects of reducing water consumption (tracked under the PRRIP) as well as reducing costs associated with irrigating city lands.

9.3.4 SEO Connectivity Discussion

PROJECT RANK: 21 (4)

PROJECT NARRATIVE:

In tandem with Paleozoic aquifer monitoring, the City of Douglas should initiate a discussion of connectivity with the SEO. This would involve discussions with the River Basin Coordinator, Ms. Michelle Hubbard, of the Wyoming SEO. The City can complete the analysis of hydrologic connection for SMW No. 1 with assistance from hydrogeologic professionals and based on the field monitoring of seeps and springs and hydrogeologic modeling of Paleozoic aquifers. With regards to evaluating whether the well's depletions are considered as a depletion in future annual reports, the SEO will need to review the City's analysis and evidence of non-connection and complete an evaluation of the non-connection data. If the well is found to be non-connected, any returns flows from the well should be considered an accretion, and the well included in the state's annual report submitted to the Governance Committee. This is because its permitted capacity is greater than 500 GPM. Since SMW No. 1 is a water use determined to be utilized before 1997 and with its depletions included within the City's 1997 benchmark, there is concern that the PRRIP Governance Committee would want to decrease the City's 1997 benchmark under annual PRRIP reporting.

9.3.5 Inner City Developments

PROJECT RANK: 26 (5)

PROJECT NARRATIVE:

The City of Douglas must consider many factors when looking at the expansion of both the population and service area. For one, the capital costs for expansion of the Lambert Subdivision and of the Seven Trails addition are costly. The projects will not be considered as capital projects in this report due to the uncertainties that accompany the developments in progress. The City should, however, budget appropriately for the size of expansions within the timeframe of completion. Another factor to consider is the amount of water demand that these new expansions would put on the existing system. As stated in Section 2.2, the population projection chosen for Douglas was 1.3% growth year over year due to the varying sizes of residential developments (low, medium, high), it can be difficult to assess the amount of population growth year over year. Section 2.3 outlines a potential guide to increased water demands using Equivalent Dwelling Units (EDU) and projected demands. The City should monitor closely the water demand brought on by these developments and ensure they will not overburden the system. As stated in Section 2.2, the City has a certain amount of water available at any given time, and, as such, the system cannot handle larger demands on it without some sort of additional augmentation. That said, it is recommended that these developments be looked at in tandem with

supply augmentation to ensure that the water system takes on no additional strain as these developments progress.

9.4 Storage Considerations

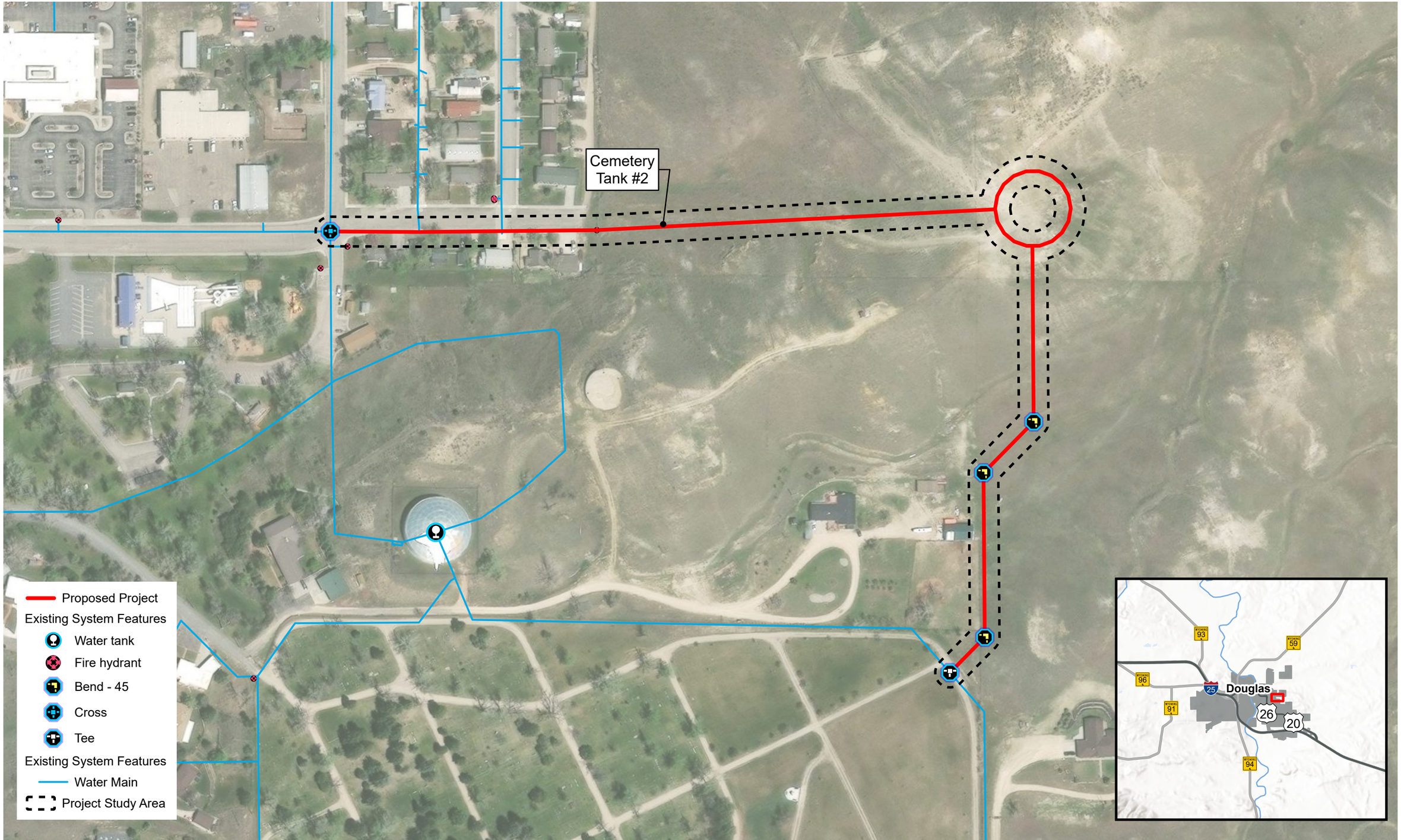
9.4.1 Cemetery Tank 2

PROJECT RANK: 3 (1)

PROJECT NARRATIVE:

This project proposes a new water storage tank near the cemetery that connects it to existing city main lines. The existing cemetery water tank is currently lower in elevation than all other pressure zones within the City of Douglas. This means that the current tank is not equipped to service the surrounding area without the use of a dedicated drainage switch (a switch that is currently installed). The new tank would provide redundancy in system storage as well as an additional water capacity within the system. The new tank would be located east of the existing tank on land owned by the City of Douglas, and balance on the Orpha pressure zone. It would sit at a higher elevation than the existing tanks. Transmission lines would be attached to new the tank and connect to an existing 14-inch ductile iron line on East Center St (terminating at 8th Street) and a 14-inch ductile line near the cemetery. The lines selected would be both a 1,340 linear-foot 16-inch line and 860 foot 16-inch line. As Douglas continues to grow, the need for increased water capacities also increases. Cemetery Tank 2 would provide water to meet increased demand and would potentially eliminate issues currently posed by existing tank.

PROJECT MAP:



PROPOSED PROJECTS
Cemetery Tank #2
DOUGLAS, WY

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Figure 43. Proposed Map for Cemetery Tank 2

COST ESTIMATE:

Table 60. Cost Estimate for Cemetery Tank 2

CONSTRUCTION COSTS					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 437,900.00	$ 437,900.00	(Subtotal #1)
Excavation	2600	CY	$ 15.00	$ 39,000.00	
Water Tank	1	LS	$ 4,000,000.00	$ 4,000,000.00	
16" Transmission Line (PVC)	1340	LF	$ 135.00	$ 180,900.00	
45 Degree Bend 14"	3	EA	$ 3,800.00	$ 11,400.00	
Tee	1	EA	$ 6,000.00	$ 6,000.00	
Cross	1	EA	$ 6,000.00	$ 6,000.00	
14" Gate Valve	1	EA	$ 10,000.00	$ 10,000.00	
Air Release Valve	1	EA	$ 22,000.00	$ 22,000.00	
Type I Pipe Bedding	540	CY	$ 55.00	$ 29,700.00	
Backfill	2100	CY	$ 35.00	$ 73,500.00	
Cost of Project Components TOTAL (Subtotal #1)	$			4,816,400.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			481,600.00	
Components + Construction Engineering Costs (Subtotal #2)	$			5,298,000.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			794,700.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			6,092,700.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			481,600.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			10,000.00	
Pre-construction Costs Total (Subtotal #4)	$			501,600.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #4 + Eligible Components)	$			6,594,300.00	(Subtotal #5)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
16" Transmission Line (PVC)	860	LF	$ 135.00	$ 116,100.00	
16" Gate Valve	1	EA	$ 11,000.00	$ 11,000.00	
Additional Cost for Construction Engineering	$			12,700.00	
Additional Cost for Preparation of Final Designs & Specifications	$			12,700.00	
Total WWDC Inelligible Project Costs Total	$			152,500.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$				6,746,800.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$				5,465,800.00

9.4.2 Relining of Orpha Tank

PROJECT RANK: 10 (2)

PROJECT NARRATIVE:

This project aims to reline the tank to extend its lifespan for further use. The tank is reaching its 25-year-old mark so it is recommended to reline the tank to ensure a longer life span. The tank is located off State Highway 93 and is the main tank for Douglas. The reline will ensure longer use as well as a good inspection to ensure the quality of the tank meets standards and if further action is needed in the future. Therefor helping prevent any problems for the future and maintaining a high quality, high functioning tank

.

PROJECT MAP:



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Figure 44. Proposed Map for Relining of Orpha Tank

PROPOSED PROJECTS
Relining of Orpha Tank
DOUGLAS, WY

COST ESTIMATE:

Table 61. Cost Estimate for Relining of Orpha Tank

CONSTRUCTION COSTS					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 38,400.00	$ 38,400.00	
Relining Chemical	25620	SF	$ 15.00	$ 384,300.00	
Cost of Project Components TOTAL (Subtotal #1)	$			422,700.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			42,300.00	(Subtotal #1)
Components + Construction Engineering Costs	$			465,000.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			69,800.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			534,800.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			42,300.00	
Permitting and Mitigation	$			-	
Legal Fees (Title of Opinion Only)	$			-	
Acquisition of Access and Rights of Way	$			-	
Pre-construction Costs Total (Subtotal #4)	$			42,300.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			577,100.00	(Subtotal #5)
Additional Cost for Construction Engineering	$			-	
Additional Cost for Preparation of Final Designs & Specifications	$			-	
Total WWDC Inelligible Project Costs Total	$			-	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$			577,100.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$			465,000.00	

9.4.3 Cemetery Tank Irrigation Conversion

PROJECT RANK: 14 (3)

PROJECT NARRATIVE:

Due to the location and size of the existing cemetery tank, it is not economically feasible to remove the tank from its current location. However, this presents the opportunity for its alternative use if a new tank was built. Rather than abandoning the tank in-place, the old tank can be converted to an irrigation “reservoir” with aims to supply water to Washington Park. This project would involve abandonment of the looping 12-inch line on the east side of the tank as well as a connection of the line traveling from the treatment plant and the line through Washington Park. After the connection to the Washington Park line is established, piping to various locations within Washington Park could be completed to provide better irrigation coverage to the park overall. This project also provides redundancy in the event of an emergency, as the lines to the distribution system would remain active in the event of a water emergency.

PROJECT MAP:

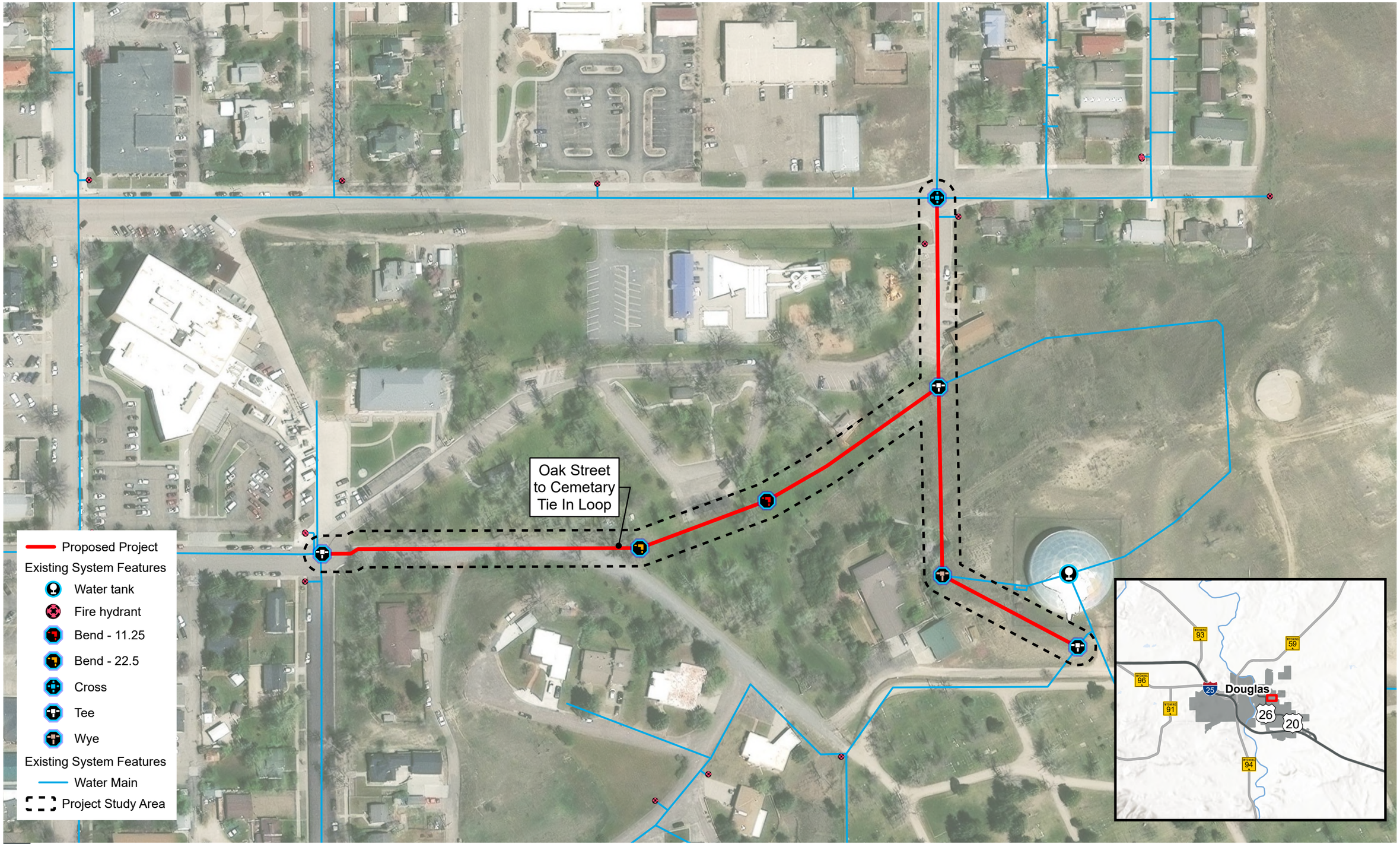


Figure 45. Proposed Map for Cemetery Tank Irrigation Conversion

COST ESTIMATE:

Table 62. Cost Estimate for Cemetery Tank Irrigation Conversion

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 26,800.00	$ 26,800.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Excavation	2100	CY	$ 15.00	$ 31,500.00	
12" Transmission Line (PVC)	770	LF	$ 75.00	$ 57,800.00	
12" Gate Valve	2	EA	$ 9,000.00	$ 18,000.00	
Abandon Line	1	EA	$ 1,500.00	$ 1,500.00	
12" Transmission Line (PVC)	1000	EA	$ 75.00	$ 75,000.00	
11.25 Degree Bend 12"	1	EA	$ 3,600.00	$ 3,600.00	
22.5 Degree Bend 12"	1	EA	$ 3,600.00	$ 3,600.00	
Tee	3	EA	$ 6,000.00	$ 18,000.00	
Wye	1	EA	$ 6,000.00	$ 6,000.00	
Type I Pipe Bedding	300	CY	$ 55.00	$ 16,500.00	
Backfill	470	CY	$ 35.00	$ 16,500.00	
Cost of Project Components TOTAL (Subtotal #2)	$			294,800.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			29,500.00	
Components + Construction Engineering Costs (Subtotal #3)	$			324,300.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			48,600.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			372,900.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			29,500.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			41,500.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$			414,400.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				414,401.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				324,300.00

9.5 Water Supply Augmentation

9.5.1 Douglas WTP

PROJECT RANK: 1 (1)

PROJECT NARRATIVE:

As noted in Section 4.4.3, the WTP has large operational limitations that allow an estimated 25% of its total capacity to be produced out of its existing infrastructure. To increase water supply, it is recommended that the WTP be either retrofitted with better technology or rebuilt to allow for higher design capacity. These solutions would allow for more water to be delivered to the distribution system at a rate of roughly 1.5 MGD.

One upside of this project is that that water is already available for use according to the City's current water right's permit, so no additional cost would be incurred for the purchasing of water. It should be noted that there is a raw water quality study occurring as of the writing of this report to determine the best path forward. Potential improvements include better pre-treatment to reduce water turbidities before meeting the filters, improvements to the old WTP to allow for rapid sand filtration and retrofitting the existing plant to allow for membrane filtration. Due to the unknowns of this project, it is hard to give an estimate of the costs of an improvement project. Each of the projects above would vary by millions of dollars depending on what is chosen. For the time being, a rule of thumb can be used to estimate the improvement costs. HDR recommends continuing with the raw water quality study, as well as pilot programs, to better inform of treatment considerations before making a final decision on treatment type. The cost estimate below will be less detailed than others previous due to the uncertainties in the design of the new plant.

PROJECT MAP:



PROPOSED PROJECTS
Water Treatment Plant Rebuild
DOUGLAS, WY

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Figure 46. Proposed Map for WTP Rehabilitation

COST ESTIMATE:

Table 63. Cost Estimate for Douglas WTP Rehabilitation

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 2,250,000.00	$ 2,250,000.00	
Water Treatment Plant Rebuild/Retrofit	1	LS	$ 20,000,000.00	$ 20,000,000.00	
Demolition/Removal of Existing WTP	1	LS	$ 2,500,000.00	$ 2,500,000.00	
Cost of Project Components TOTAL (Subtotal #2)	$			24,750,000.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			2,475,000.00	
Components + Construction Engineering Costs (Subtotal #3)	$			27,225,000.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			4,083,800.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			31,308,800.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			2,475,000.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			2,487,000.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$			33,795,800.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				33,795,800.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				27,225,000.00

9.5.2 Exploratory Well in the Fort Union Formation

PROJECT RANK: 2 (2)

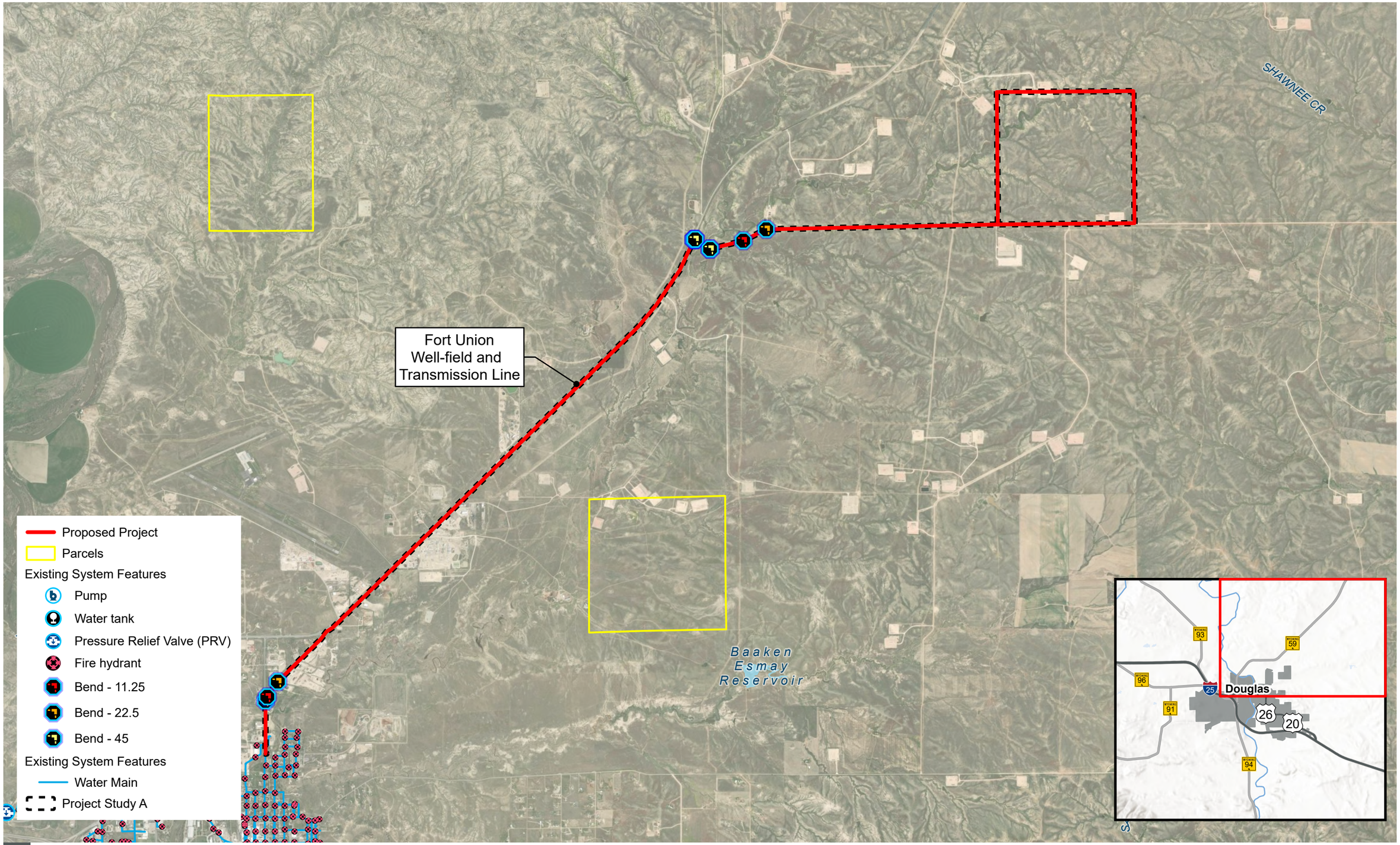
PROJECT NARRATIVE:

The Western Sky 1 well was drilled and completed in 2018 to a depth of 2,646 feet, with the target being the lower Fort Union Formation (Tullock Member). This well was drilled about three miles northeast of the City of Douglas. Although the Western Sky 1 well produced water, both the aquifer transmissivity and the estimated yield from the Tullock were relatively low. It is important to note that the Western Sky well was a multiple completion, perforated not only in the Tullock but also commingled with numerous overlying sands and lignite seams within the Fort Union—roughly 1,600 feet of perforated completion. The water quality of the Western Sky well was not suitable without treatment.

Should the City explore the lower Fort Union, specifically the Tullock, the test well should be a single completion and fully screened in the Tullock Member. To minimize the transmission line costs, the exploration hole should be drilled as close to the City of Douglas as possible. Anticipated depth may range from 2,500 to 3,000 feet. The well completion should be within the Green Zone and two State of Wyoming properties have been identified to limit potential transmission line costs.

An alternative test well drill site could be on city-owned land near the water tanks, but such a location is outside of the Green Zone. One can clearly argue that a well over 2,500 feet deep is not tributary to the North Platte; however, this adds a level of complexity to the well siting arguments. For the cost estimate, it was assumed that the exploratory well would reach a total depth (TD) of 3,000 feet near the bottom of the formation. In addition, transmission costs from the site listed above are used as a guide to the potential transmission costs if the well produces adequate water. If Douglas were to consider a wellfield after the exploration, the initial cost of the drilling could be used to extrapolate a total cost of a wellfield development in the future. In addition to the well cost estimate, a cost for a potential transmission line if the wellfield were to be developed is also provided below.

PROJECT MAP:



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PROPOSED PROJECTS

Fort Union Well-field & Transmission Line

DOUGLAS, WY

Figure 47. Proposed Map for Fort Union Wellfield and Transmission Line

COST ESTIMATE:

Table 64. Cost Estimate for Fort Union Test Well

CONSTRUCTION COSTS					
Exploratory Drilling					
Component	Quantity	Units	Unit Cost	Total Cost	(Subtotal #1)
Drilling Mobilization/Demobilization	1	LS	$ 208,200.00	$ 208,200.00	
Surface Casing Installed and Cemented	100	LF	$ 2,000.00	$ 200,000.00	
Intermediate Casing Installed and Cemented	1300	LF	$ 400.00	$ 520,000.00	
Intermediate Borehole Mud Products and Lost Circulation Cementing	1	LS	$ 60,000.00	$ 60,000.00	
Liner Borehole	1700	LF	$ 300.00	$ 510,000.00	Assumed 3000 ft TD
Open Borehole Geophysical Logging	1	LS	$ 28,000.00	$ 28,000.00	
Liner Casing Installed	1500	LF	$ 100.00	$ 150,000.00	
Liner Screen Installed	300	LF	$ 300.00	$ 90,000.00	
Liner Hanger System Installed	1	LS	$ 92,000.00	$ 92,000.00	
Well Development	72	HR	$ 1,800.00	$ 129,600.00	
Cased Hole Geophysical Logging	1	EA	$ 20,000.00	$ 20,000.00	
Video Logging	1	EA	$ 7,500.00	$ 7,500.00	
Temporary Pumping System	1	LS	$ 80,000.00	$ 80,000.00	
Pumping Tests	72	HR	$ 650.00	$ 46,800.00	
Disinfection	1	LS	$ 4,500.00	$ 4,500.00	
Labor and Equipment During Lost Circulation	120	HR	$ 1,200.00	$ 144,000.00	
Cost of Project Components TOTAL (Subtotal #1)	$			2,290,600.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			229,100.00	
Components + Construction Engineering Costs	$			2,519,700.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			378,000.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			2,897,700.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			229,100.00	
Permitting and Mitigation	$			15,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			10,000.00	
Pre-construction Costs Total (Subtotal #4)	$			259,100.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			3,156,800.00	(Subtotal #5)
Additional Cost for Construction Engineering	$			-	
Additional Cost for Preparation of Final Designs & Specifications	$			-	
Total WWDC Inelligible Project Costs Total	$			-	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$			3,156,800.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$			2,519,700.00	

Table 65. Cost Estimate for Fort Union Transmission Line

CONSTRUCTION COSTS					
Transmission Line					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 646,300.00	$ 646,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	300	SY	$ 10.00	$ 3,000.00	
Excavation	47000	CY	$ 15.00	$ 705,000.00	
12" Transmission Line (PVC)	39000	LF	$ 75.00	$ 2,925,000.00	
11.25 Degree Bend 12"	5	EA	$ 3,600.00	$ 18,000.00	
22.5 Degree Bend 12"	3	EA	$ 3,600.00	$ 10,800.00	
45 Degree Bend 12"	3	EA	$ 3,600.00	$ 10,800.00	
12" Gate Valve	49	EA	$ 9,000.00	$ 438,800.00	
Air Release Valve	10	EA	$ 22,000.00	$ 220,000.00	
3" Asphaltic Pavement Mat	300	SY	$ 55.00	$ 16,500.00	
Type I Pipe Bedding	9000	CY	$ 55.00	$ 495,000.00	
Backfill	38000	CY	$ 35.00	$ 1,330,000.00	
Casing Pipe	600	LF	$ 450.00	$ 270,000.00	
Cost of Project Components TOTAL (Subtotal #1)	$			7,108,900.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			710,900.00	
Components + Construction Engineering Costs	$			7,819,800.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			1,173,000.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			8,992,800.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			710,900.00	
Permitting and Mitigation	$			10,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			20,000.00	
Pre-construction Costs Total (Subtotal #4)	$			745,900.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			9,738,700.00	(Subtotal #5)
Additional Cost for Construction Engineering	$			-	
Additional Cost for Preparation of Final Designs & Specifications	$			-	
Total WWDC Inelligible Project Costs Total	$			-	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$			9,738,700.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$			7,819,800.00	

9.5.3 Water Rights Purchases

PROJECT RANK: 11 (3)

PROJECT NARRATIVE:

The City could also pursue the addition of water rights to their portfolio. Pre-existing rights around Douglas are vast in both surface and ground sources. For this potential project, groundwater will be discussed due to the limitations of treating more surface water. If the City were to try and obtain more groundwater, multiple factors must be considered. For one, proximity to Douglas would be critical in reducing transmission costs. Another consideration would be obtaining water quality data to ensure lower treatment requirements, like those found at LBES and SMW. The last consideration would be beneficial use type of the potential rights in question. Depending on the type of use, usually irrigation, the overall flow for a given year can be cut by up to 50% if it were to be changed to a higher beneficial use (municipal). Given the overall low volume of public water sales in the state, it can be hard to predict an overall cost for this type of augmentation. The City must ensure that if they choose to acquire rights, they understand that the costs can vary due to appropriation amount and quality. Additional consideration about conveyance cost (around $0.5 million/mile) would drive up overall costs as well. Due to the complexities in purchasing water rights such as rates for a specific flow, there will be no project map and the cost estimate for this alternative only includes the acquisition of water rights per acre-foot.

COST ESTIMATE:

Table 66. Cost Estimate for Water Rights Purchases

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost	$			-	
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Pre-1904 Water Rights Acquisition	1000	Ac-ft	$ 4,500.00	$ 4,500,000.00	(Subtotal #1)
TOTAL PROJECT COST					
Total Project Cost	$				4,500,000.00

9.5.4 Storage Water Contracts

PROJECT RANK: 23 (4)

PROJECT NARRATIVE:

As discussed in Section 6.3, there are multiple storage water contracts available to the City of Douglas if they are chosen to be pursued. These include storage contracts for water held in either Pathfinder or Glendo reservoirs. For the Pathfinder contract, the storage can be obtained through WWDC. The costs are relatively low, $5 for every acre-foot served (readiness to serve) and a $25 release fee. This contract is a 25-year contract that allows for releases from the Wyoming Account under the Pathfinder Modification Project (PMP).

Alternatively, storage water at Glendo is available on a year-to-year basis from the U.S. Bureau of Reclamation at the cost of $75 for municipal water needs. These contracts could be useful in the event of water shortage during an administrative call. As discussed previously, none of Douglas' rights would be affected during a potential late summer administration, but these contracts could provide additional water in the event of very low flows on the NPR. With that said, these contracts would only be useful if the capacity of the WTP were to be increased by either process improvements or a new treatment process. For this there will be no project map and the cost estimate, assumes that either contract will be 200 acre-feet of water (65 MG).

COST ESTIMATE:

Table 67. Cost Estimate for Water Rights Contracts

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Pathfinder Readiness to Serve Payment	200	Ac-ft	$ 5.00	$ 1,000.00	Paid every year
Pathfinder Release Payment	200	Ac-ft	$ 25.00	$ 5,000.00	Paid upon release only
Glendo Readiness to Serve Payment	200	Ac-ft	$ 25.00	$ 5,000.00	Paid every year
Glendo Release Payment	200	Ac-ft	$ 75.00	$ 15,000.00	Paid upon release only
Itemized Costs of Inelligible Project Components	$			25,000.00	Subtotal #2
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #2)	$				25,000.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$				25,000.00

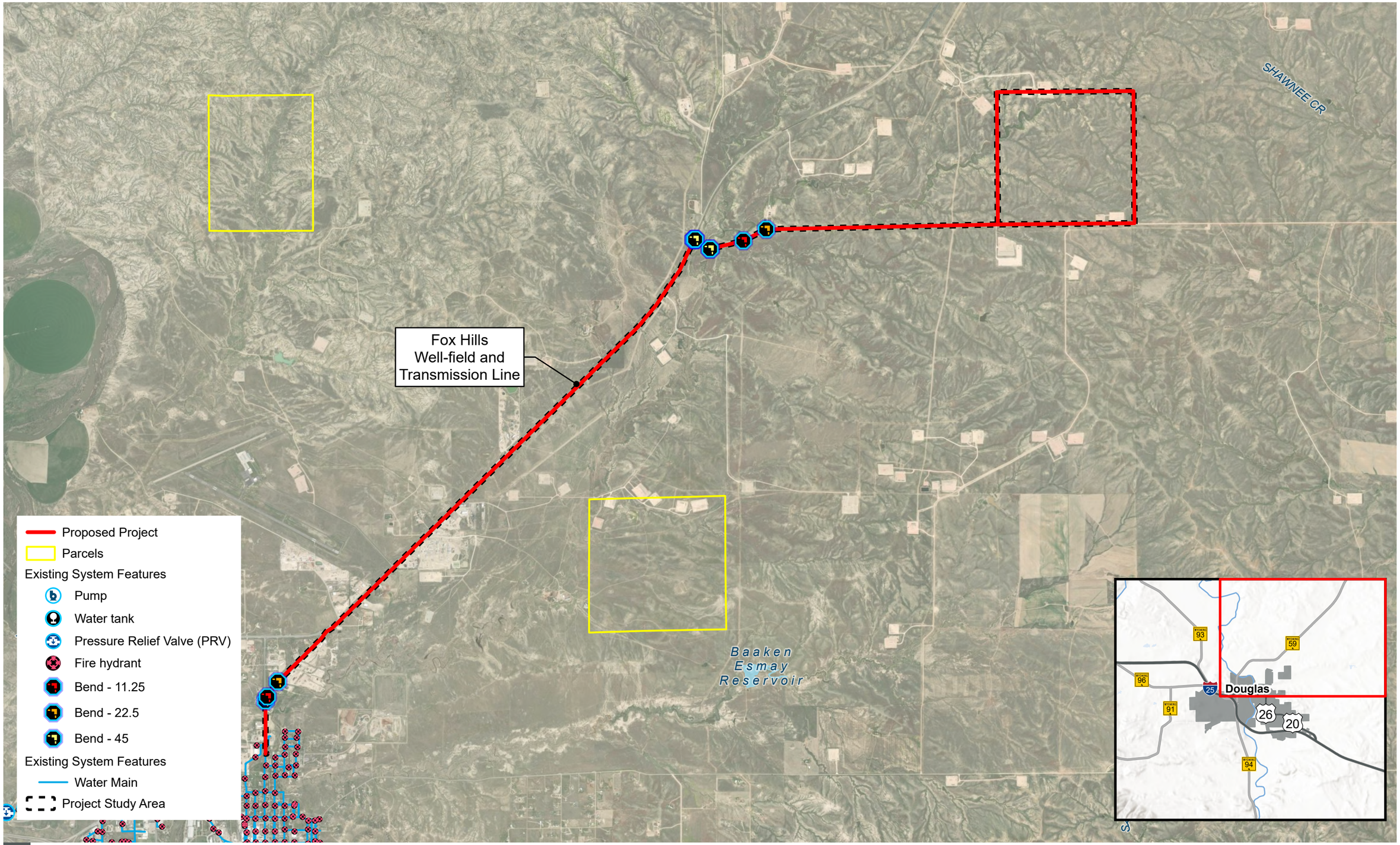
9.5.5 Exploratory Well in the Fox Hills Formation

PROJECT RANK: 24 (5)

PROJECT NARRATIVE:

Most hydrologic data for the Fox Hills aquifer system is from shallow wells near the outcrop zone. Because these are commonly low-yield stock wells, extensive aquifer testing has not been conducted. The deeper Fox Hill Aquifer in the Powder River Basin has not been explored, and a well or wells in the Green Zone could potentially provide an additional source of groundwater for the City of Douglas. The main disadvantages for a Fox Hill well would be the depth of the well (greater than approximately 6,000 feet), generally higher total dissolved solids, and the associated costs to drill and complete the well. The well completion should be within the Green Zone and the properties identified in the Fort Union exploration also apply here. Additional test well drill sites could be on city-owned land near the water tanks, but such a location is outside of the Green Zone. One can clearly argue that a 6,000 foot well is not tributary to the North Platte; however, this adds a level of complexity to the well siting argument. In addition, as with the Fort Union project, a cost for a potential transmission line if the wellfield were to be developed is also provided below.

PROJECT MAP:



PROPOSED PROJECTS

Fox Hills Well-field & Transmission Line

DOUGLAS, WY

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Figure 48. Proposed Map for Fox Hills Wellfield and Transmission Line

COST ESTIMATE:

Table 68. Cost Estimate for Fox Hills Test Well

CONSTRUCTION COSTS					
Exploratory Drilling					
Component	Quantity	Units	Unit Cost	Total Cost	(Subtotal #1)
Drilling Mobilization/Demobilization	1	LS	$ 254,900.00	$ 254,900.00	
Surface Casing Installed and Cemented	100	LF	$ 2,000.00	$ 200,000.00	
Intermediate Casing Installed and Cemented	1750	LF	$ 400.00	$ 700,000.00	
Intermediate Borehole Mud Products and Lost Circulation Cementing	1	LS	$ 60,000.00	$ 60,000.00	
Liner Borehole	2250	LF	$ 300.00	$ 675,000.00	Assumed 4000 ft TD
Open Borehole Geophysical Logging	1	LS	$ 28,000.00	$ 28,000.00	
Liner Casing Installed	2000	LF	$ 100.00	$ 200,000.00	
Liner Screen Installed	300	LF	$ 300.00	$ 90,000.00	
Liner Hanger System Installed	1	LS	$ 92,000.00	$ 92,000.00	
Well Development	96	HR	$ 1,800.00	$ 172,800.00	
Cased Hole Geophysical Logging	1	EA	$ 20,000.00	$ 20,000.00	
Video Logging	1	EA	$ 7,500.00	$ 7,500.00	
Temporary Pumping System	1	LS	$ 80,000.00	$ 80,000.00	
Pumping Tests	72	HR	$ 650.00	$ 46,800.00	
Disinfection	1	LS	$ 4,500.00	$ 4,500.00	
Labor and Equipment During Lost Circulation	144	HR	$ 1,200.00	$ 172,800.00	
Cost of Project Components TOTAL (Subtotal #1)	$			2,804,300.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			280,400.00	
Components + Construction Engineering Costs	$			3,084,700.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			462,700.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			3,547,400.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			280,400.00	
Permitting and Mitigation	$			15,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			10,000.00	
Pre-construction Costs Total (Subtotal #4)	$			310,400.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			3,857,800.00	(Subtotal #5)
Additional Cost for Construction Engineering	$			-	
Additional Cost for Preparation of Final Designs & Specifications	$			-	
Total WWDC Inelligible Project Costs Total	$			-	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$			3,857,800.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$			3,084,700.00	

Table 69. Cost Estimate for Fox Hills Transmission Line

CONSTRUCTION COSTS					
Transmission Line					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 646,500.00	$ 646,500.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	300	SY	$ 10.00	$ 3,000.00	
Excavation	47000	CY	$ 15.00	$ 705,000.00	
12" Transmission Line (PVC)	39000	LF	$ 75.00	$ 2,925,000.00	
11.25 Degree Bend 12"	5	EA	$ 3,600.00	$ 18,000.00	
22.5 Degree Bend 12"	3	EA	$ 3,600.00	$ 10,800.00	
45 Degree Bend 12"	3	EA	$ 3,600.00	$ 10,800.00	
12" Gate Valve	49	EA	$ 9,000.00	$ 441,000.00	
Air Release Valve	10	EA	$ 22,000.00	$ 220,000.00	
3" Asphaltic Pavement Mat	300	SY	$ 55.00	$ 16,500.00	
Type I Pipe Bedding	9000	CY	$ 55.00	$ 495,000.00	
Backfill	38000	CY	$ 35.00	$ 1,330,000.00	
Casing Pipe	600	LF	$ 450.00	$ 270,000.00	
Cost of Project Components TOTAL (Subtotal #1)	$			7,111,600.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			711,200.00	
Components + Construction Engineering Costs	$			7,822,800.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			1,173,400.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			8,996,200.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			711,200.00	
Permitting and Mitigation	$			15,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			10,000.00	
Pre-construction Costs Total (Subtotal #4)	$			741,200.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 + Subtotal #4)	$			9,737,400.00	(Subtotal #5)
Additional Cost for Construction Engineering	$			-	
Additional Cost for Preparation of Final Designs & Specifications	$			-	
Total WWDC Inelligible Project Costs Total	$			-	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$			9,737,400.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$			7,822,800.00	

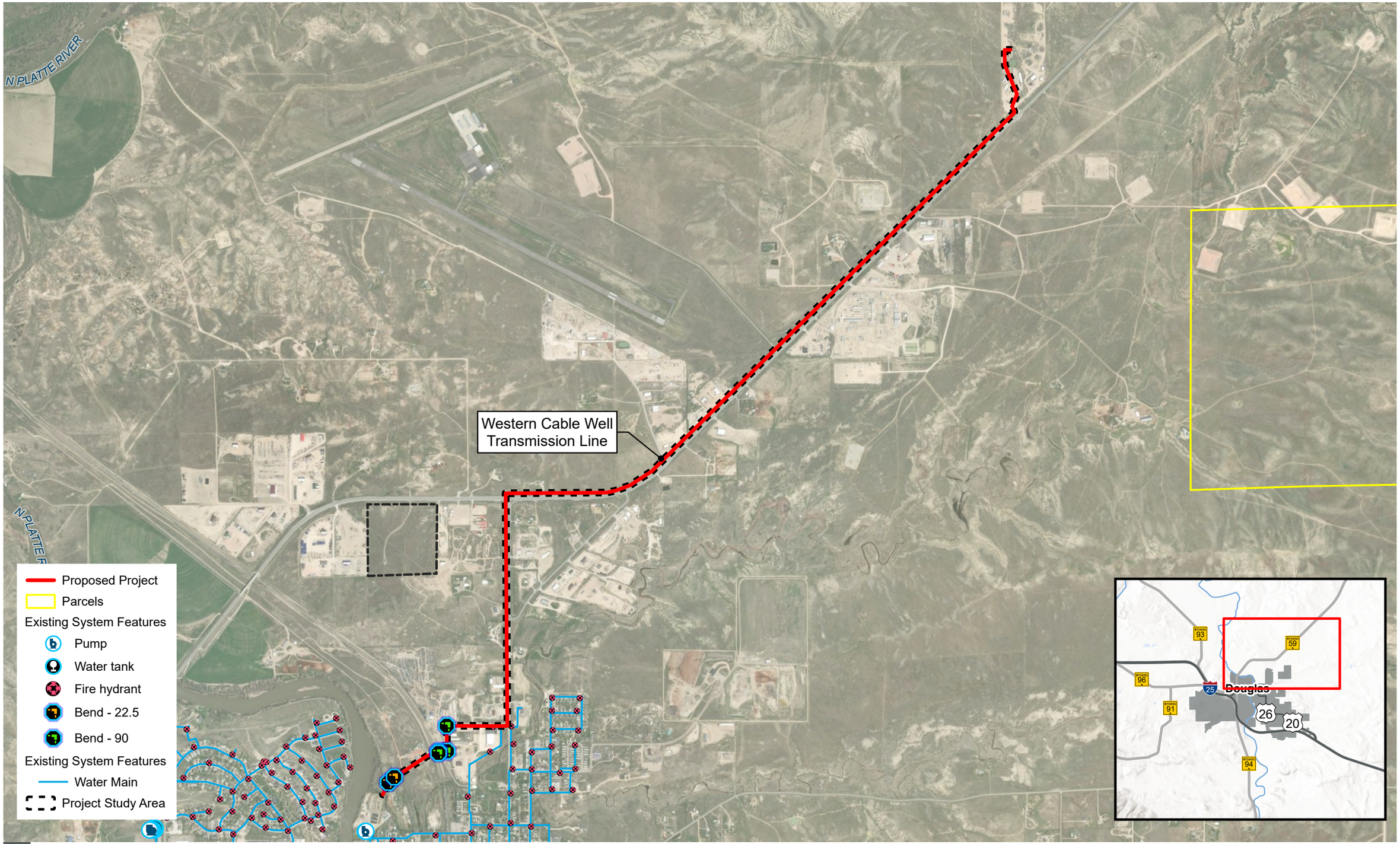
9.5.6 Purchase of the Western Cable Well

PROJECT RANK: 25 (6)

PROJECT NARRATIVE:

This project aims to transport water from an existing well for use within the City. As discussed in the water sources section of this report, Western Cable LLC is interested in selling their producing well to the City of Douglas. After analysis of water quality, it was found that the well has a high concentration of ammonia, as well as high TDS and iron content. This would mean that in order for the well water to be utilized in a way that is congruous with water safety standards, a package plant would need to be installed onsite to treat its water before entering the existing treatment or distribution systems. Alternatively, this well could be used for raw water irrigation for the parks system of the City of Douglas, negating the use of treated water for irrigation. This would circumvent the need for a water treatment plant but could drive up costs for the increased distance of transmission. The proposed route of this new line is as follows: the 8-inch transmission line would follow Highway 59 to 4th Street from this intersection, the line would travel south down 4th Street and connect to the City's water main lines. The total length of pipe required for this effort is estimated to be around 21,000 feet of 8-inch pipe.

PROJECT MAP:



PROPOSED PROJECTS
Western Cable Well Transmission Line
DOUGLAS, WY

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Figure 49. Proposed Map for Western Cable Well Transmission Line

COST ESTIMATE:

Table 70. Cost Estimate for Purchase of Western Cable Well

CONSTRUCTION COSTS					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 308,300.00	$ 308,300.00	(Subtotal #1)
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	100	SY	$ 10.00	$ 1,000.00	
Excavation	25000	CY	$ 15.00	$ 375,000.00	
8" Transmission Line (PVC)	21000	LF	$ 45.00	$ 945,000.00	
11.25 Degree Bend 8"	2	EA	$ 3,200.00	$ 6,400.00	
22.5 Degree Bend 8"	4	EA	$ 3,200.00	$ 12,800.00	
45 Degree Bend 8"	3	EA	$ 3,200.00	$ 9,600.00	
90 Degree Bend 8"	5	EA	$ 3,200.00	$ 16,000.00	
8" Gate Valve	26	EA	$ 7,000.00	$ 182,000.00	
Air Release Valve	15	EA	$ 22,000.00	$ 330,000.00	
3" Asphaltic Pavement Mat	100	SY	$ 55.00	$ 5,500.00	
Type I Pipe Bedding	4000	CY	$ 55.00	$ 220,000.00	
Backfill	21000	CY	$ 35.00	$ 735,000.00	
Casing Pipe	500	LF	$ 450.00	$ 225,000.00	
Cost of Project Components TOTAL (Subtotal #1)	$			3,391,600.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			339,200.00	
Components + Construction Engineering Costs (Subtotal #2)	$			3,730,800.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			559,600.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			4,290,400.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			339,200.00	
Permitting and Mitigation	$			10,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			10,000.00	
Pre-construction Costs Total (Subtotal #4)	$			364,200.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 +Subtotal #4)	$			4,654,600.00	(Subtotal #5)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Purchase Well	1	EA	$ 2,000,000.00	$ 2,000,000.00	
Package Treatment Plant	1	EA	$ 2,000,000.00	$ 2,000,000.00	
Component Only Cost	$			4,000,000.00	Subtotal #6
Additional Cost for Construction Engineering	$			400,000.00	
Additional Cost for Preparation of Final Designs & Specifications	$			50,000.00	
Contingency (Subtotal #6 x 15%)	$			600,000.00	
Total WWDC Inelligible Project Costs Total	$			5,050,000.00	Subtotal #7
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$				9,710,000.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$				8,140,000.00

9.6 Water Line Projects

9.6.1 Richards St. Connection

PROJECT RANK: 4 (1)

PROJECT NARRATIVE:

This project proposes a water transmission connection in the south of Douglas to provide water across the railroad. This transmission line would serve to improve water delivery in the event of an emergency in that area. The current connections across railroad property are over one mile apart from each other, which could impact water delivery if one or both lines were to fail. To combat this, this project provides a transmission connection on a stretch of road that has no waterline along West Richards Street, a midway point between the existing connections. This new connection would allow for a tie in at the intersection of Labonte Road and Richards Street to be extended to Smylie Road. No distribution connections would be made to this line. This redundant connection would also have to be bored under the UPRR property, like those on Robin Lane and West Center Street. This new transmission line would be approximately 1,900 feet of 8-inch PVC pipe.

PROJECT MAP:



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Figure 50. Proposed Map for Richards St Connection

COST ESTIMATE:

Table 71. Cost Estimate for Richards St. Connection

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #1)	$			-	Subtotal # 1
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 41,700.00	$ 41,700.00	
Traffic Control	1	EA	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	80	SY	$ 10.00	$ 800.00	
Excavation	2300	CY	$ 15.00	$ 34,500.00	
8" Transmission Line (PVC)	1900	LF	$ 45.00	$ 85,500.00	
11.25 Degree Bend 8"	2	EA	$ 3,200.00	$ 6,400.00	
90 Degree Bend 8"	2	EA	$ 3,200.00	$ 6,400.00	
Tee	2	EA	$ 6,000.00	$ 12,000.00	
8" Gate Valve	2	EA	$ 7,000.00	$ 14,000.00	
Casing Pipe	320	LF	$ 450.00	$ 144,000.00	
Type I Pipe Bedding	320	CY	$ 55.00	$ 17,600.00	
Backfill	2000	CY	$ 35.00	$ 70,000.00	
3" Asphaltic Pavement Mat	100	SY	$ 55.00	$ 5,500.00	
Cost of Project Components TOTAL (Subtotal #2)	$			458,400.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			45,800.00	
Components + Construction Engineering Costs (Subtotal #3)	$			504,200.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			75,600.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			579,800.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%) (Subtotal #3)	$			45,800.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			57,800.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #6)	$			637,600.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$			637,600.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$			504,200.00	

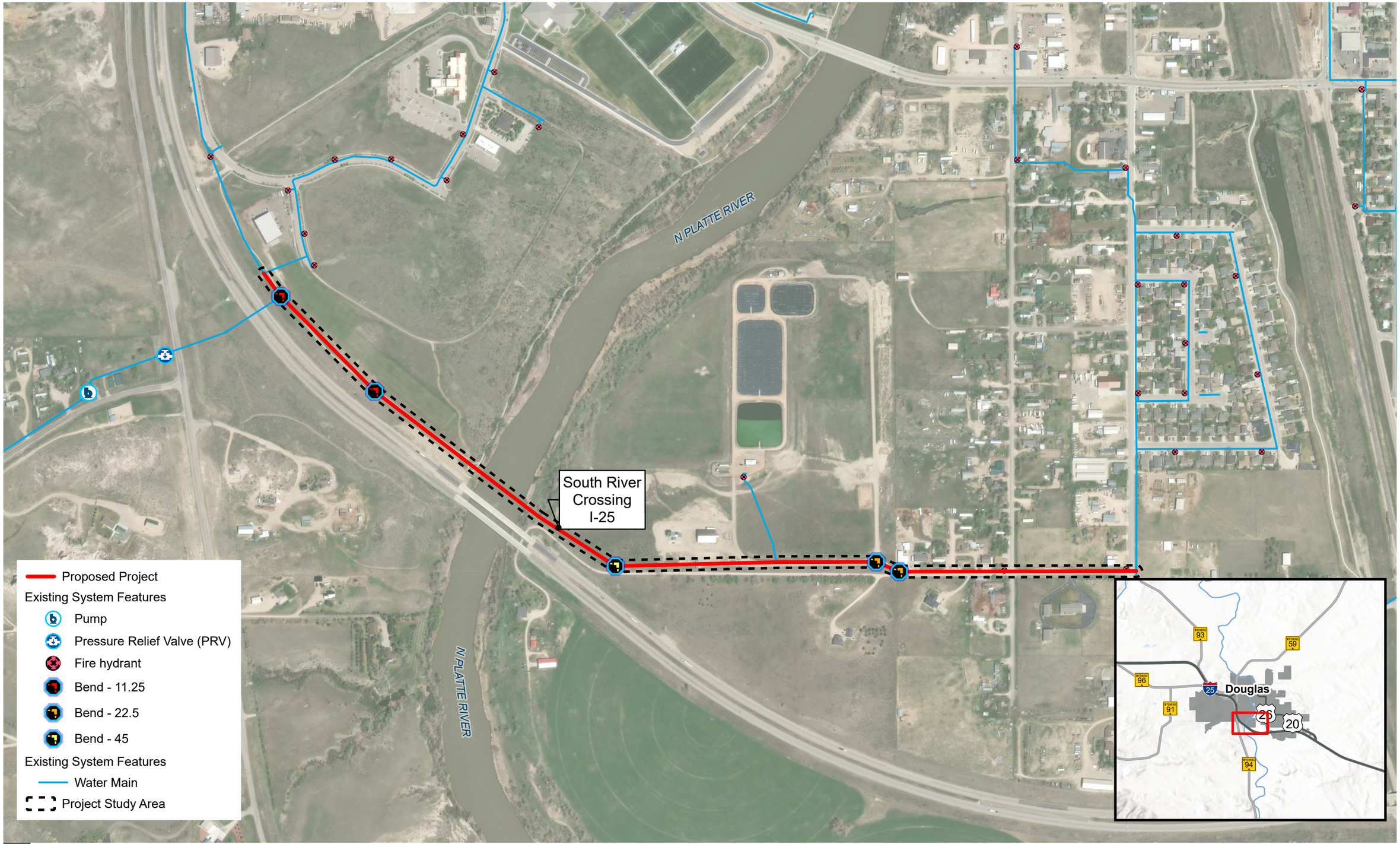
9.6.2 South River Crossing (I-25)

PROJECT RANK: 5 (2)

PROJECT NARRATIVE:

This project aims to add some redundancy and resiliency to the water system by adding another crossing under the NPR. A third crossing would allow for a more complete loop of the water system in the case of a shutdown of either of the other two water mains under the NPR. The proposed route of this new pipeline is as follows: 14-inch PVC transmission lines carry water from Brownfield Road following down Robin Lane where it offsets to the north of the road, parallel to Interstate 25. Then it travels under the North Platte River connecting to existing City's water main from Prosperity Parkway. The total length of pipe is estimated to be around 2,300 feet of 14-inch PVC pipe. Additionally, more water lines on the west side of Douglas can be replaced after the completion of this project.

PROJECT MAP:



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Figure 51. Proposed Map for South I-25 Crossing

COST ESTIMATE:

Table 72. Cost Estimate for South River Crossing (1-25)

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 +Subtotal #4)	$	-			(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 88,000.00	$ 88,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Excavation	2730	CY	$ 15.00	$ 41,000.00	
12" Transmission Line (PVC)	2300	LF	$ 75.00	$ 172,500.00	
Directional Bore	450	LF	$ 750.00	$ 337,500.00	
Casing Pipe	350	LF	$ 450.00	$ 157,500.00	
45 Degree Bend 12"	3	EA	$ 3,600.00	$ 10,800.00	
22.5 Degree Bend 12"	1	EA	$ 3,600.00	$ 3,600.00	
11.25 Degree Bend 12"	1	EA	$ 3,600.00	$ 3,600.00	
12" Gate Valve	3	EA	$ 9,000.00	$ 27,000.00	
Type I Pipe Bedding	520	CY	$ 55.00	$ 28,600.00	
Backfill	2210	CY	$ 35.00	$ 77,400.00	
Cost of Project Components TOTAL (Subtotal #2)	$			967,500.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			96,800.00	
Components + Construction Engineering Costs (Subtotal #2)	$			1,064,300.00	(Subtotal #3)
Contingency (Subtotal #2 x 15%)	$			159,600.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			1,223,900.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			96,800.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			108,800.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal #4+ Subtotal #5)	$			1,332,700.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$			1,332,700.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$			1,064,300.00	

9.6.3 Cemetery to Cheyenne St. Repair

PROJECT RANK: 6 (3)

PROJECT NARRATIVE:

In conjunction with the addition of a tank into the system (Cemetery Tank 2), this project proposes the addition and replacement of water line from the new tank to the intersection of Cheyenne St and Williams St. This connection would allow for redundancy in the system, with the added benefit of replacing some of the DIP lines that are at the end of their usable lifecycle. The proposed route of this new pipeline is as follows: 14-inch PVC transmission lines carry water from the north-east corner of the Cemetery down S 12th St where the line turns east behind houses on Frontier Drive. The line will then follow down Williams Street to the intersection of Cheyenne St., connecting to the existing City's main water lines. The total length of pipe required for this effort is estimated to be around 1,900 feet of 14-inch PVC pipe.

PROJECT MAP:

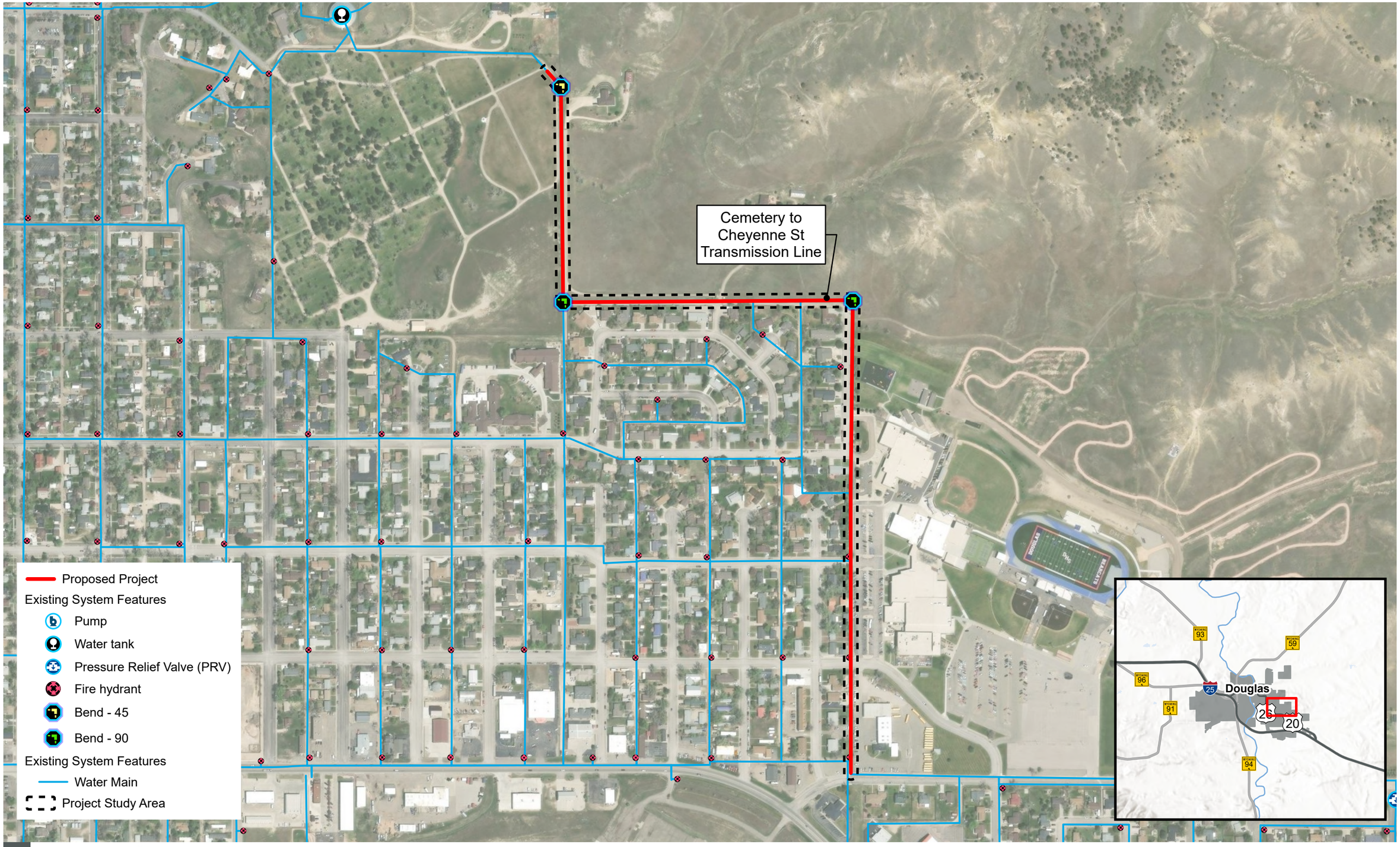


Figure 52. Proposed Map for Cemetery to Cheyenne St. Replacement

COST ESTIMATE:

Table 73. Cost Estimate for Cemetery to Cheyenne St

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 +Subtotal #4)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 37,600.00	$ 37,600.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	100	SY	$ 10.00	$ 1,000.00	
Excavation	2290	CY	$ 15.00	$ 34,400.00	
14" Transmission Line (PVC)	1930	LF	$ 100.00	$ 193,000.00	
14" Gate Valve	2	EA	$ 10,000.00	$ 20,000.00	
3" Asphaltic Pavement Mat	100	SY	$ 55.00	$ 5,500.00	
Type I Pipe Bedding	500	CY	$ 55.00	$ 27,500.00	
45 Degree Bend 14"	1	EA	$ 3,800.00	$ 3,800.00	
90 Degree Bend 14"	2	EA	$ 3,800.00	$ 7,600.00	
Backfill	1790	CY	$ 35.00	$ 62,700.00	
Cost of Project Components TOTAL (Subtotal #2)	$			413,100.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			41,300.00	
Components + Construction Engineering Costs (Subtotal #3)	$			454,400.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			68,200.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			522,600.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			41,300.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			53,300.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal #4+ Subtotal #5)	$			575,900.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				580,000.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				454,400.00

9.6.4 Jefferson St. Replacement

PROJECT RANK: 7 (4)

PROJECT NARRATIVE:

A leak was detected on the south end of Jefferson Street. The aim of this particular project is to repair and replace piping at the leak site and the surrounding area. The leak was found 146 feet from the valve on the southern side of Jefferson that services a dead-end line. The leak was estimated to be less than 5 GPM but this was unable to be confirmed with a ground microphone. Piping in the area is made of ductile iron which has, over time become corroded. Corrosion has led to leaks across town, so the replacement of all ductile iron pipes in the area with PVC piping has the ability to both stop and prevent leaks.

PROJECT MAP:



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Figure 53. Proposed Map for Jefferson St Repair

COST ESTIMATE:

Table 74. Cost Estimate for Jefferson St. Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost	$	-			(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 38,100.00	$ 38,100.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	800	SY	$ 10.00	$ 8,000.00	
Excavation	2200	CY	$ 15.00	$ 33,000.00	
12" Transmission Line (PVC)	1800	LF	$ 75.00	$ 135,000.00	
90 Degree Bend 12"	1	EA	$ 3,600.00	$ 3,600.00	
Tee	6	EA	$ 6,000.00	$ 36,000.00	
12" Gate Valve	2	EA	$ 9,000.00	$ 18,000.00	
Type I Pipe Bedding	300	CY	$ 55.00	$ 16,500.00	
Backfill	1900	CY	$ 35.00	$ 66,500.00	
3" Asphaltic Pavement Mat	800	SY	$ 55.00	$ 44,000.00	
Cost of Project Components TOTAL (Subtotal #2)	$			418,700.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			41,900.00	
Components + Construction Engineering Costs (Subtotal #3)	$			460,600.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			69,100.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			529,700.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			41,900.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			53,900.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$			583,600.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				583,600.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				460,600.00

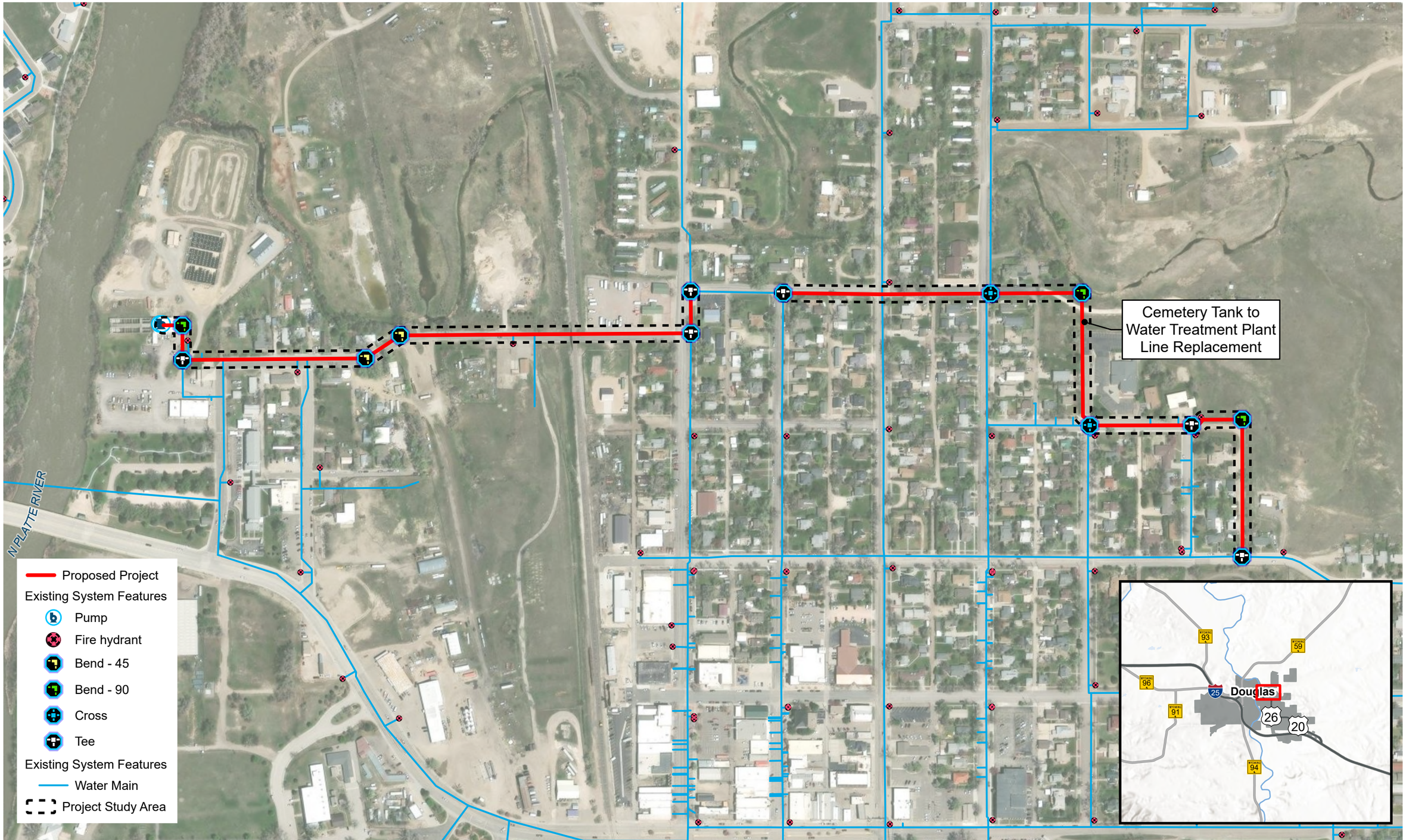
9.6.5 Cemetery Tank Main Connect

PROJECT RANK: 9 (5)

PROJECT NARRATIVE:

The line connecting the Cemetery tank to the WTP is currently comprised of 6,200 feet of a 14-inch DIP that runs along North 8th Street. It is recommended that this DIP is replaced with PVC pipe and upsized to 16-inch to prevent future pipe corrosion and the development of leaks as well as increase the flow to the tank.

PROJECT MAP:



PROPOSED PROJECTS

Cemetery Tank to Water Treatment Plant Line Replacement

DOUGLAS, WY

\\SXF-SRV01\ENG\GIS\PROJECTS\CITY_OF_DOUGLASWY\DOUGLAS_WATER_MP_1039984207.2_WIP\APRX\DOUGLAS_WATER_MP.APRX DATE: 9/16/2025

Figure 54. Proposed Map for Cemetery Tank to WTP Connection

COST ESTIMATE:

Table 75. Cost Estimate for WTP to Cemetery Tank Replacement

CONSTRUCTION COSTS					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 144,000.00	$ 144,000.00	(Subtotal #1)
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	2700	SY	$ 10.00	$ 27,000.00	
Excavation	7000	CY	$ 15.00	$ 105,000.00	
16" Transmission Line (PVC)	6000	LF	$ 135.00	$ 810,000.00	
16" Gate Valve	6	EA	$ 11,000.00	$ 66,000.00	
3" Asphaltic Pavement Mat	2700	SY	$ 55.00	$ 149,000.00	
Type I Pipe Bedding	1000	CY	$ 55.00	$ 55,000.00	
Backfill	6000	CY	$ 35.00	$ 210,000.00	
Cost of Project Components TOTAL (Subtotal #1)	$			1,586,000.00	(Subtotal #1)
Construction Engineering (Subtotal #1 x 10%)	$			159,000.00	
Components + Construction Engineering Costs (Subtotal #2)	$			1,745,000.00	(Subtotal #2)
Contingency (Subtotal #2 x 15%)	$			262,000.00	
Construction Costs Total (Subtotal #2 + Contingency)	$			2,007,000.00	(Subtotal #3)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			159,000.00	
Permitting and Mitigation	$			-	
Legal Fees (Title of Opinion Only)	$			-	
Acquisition of Access and Rights of Way	$			-	
Pre-construction Costs Total (Subtotal #4)	$			159,000.00	(Subtotal #4)
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 +Subtotal #4)	$			2,166,000.00	(Subtotal #5)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 144,000.00	$ 144,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	2700	SY	$ 10.00	$ 27,000.00	
Excavation	7000	CY	$ 15.00	$ 105,000.00	
16" Transmission Line (PVC)	6000	LF	$ 135.00	$ 810,000.00	
16" Gate Valve	6	EA	$ 11,000.00	$ 66,000.00	
3" Asphaltic Pavement Mat	2700	SY	$ 55.00	$ 149,000.00	
Type I Pipe Bedding	1000	CY	$ 55.00	$ 55,000.00	
Backfill	6000	CY	$ 35.00	$ 210,000.00	
Component Only Cost	$			1,586,000.00	Subtotal #6
Additional Cost for Construction Engineering	$			158,600.00	
Additional Cost for Preparation of Final Designs & Specifications	$			178,600.00	
Contingency (Subtotal #6 x 15%)	$			237,900.00	
Total WWDC Inelligible Project Costs Total	$			2,161,100.00	Subtotal #7
TOTAL PROJECT COST					
Total Project Cost (Subtotal #5 + Subtotal #6)	$				4,330,000.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #1 + (Subtotal #1 x 10%))	$				3,490,000.00

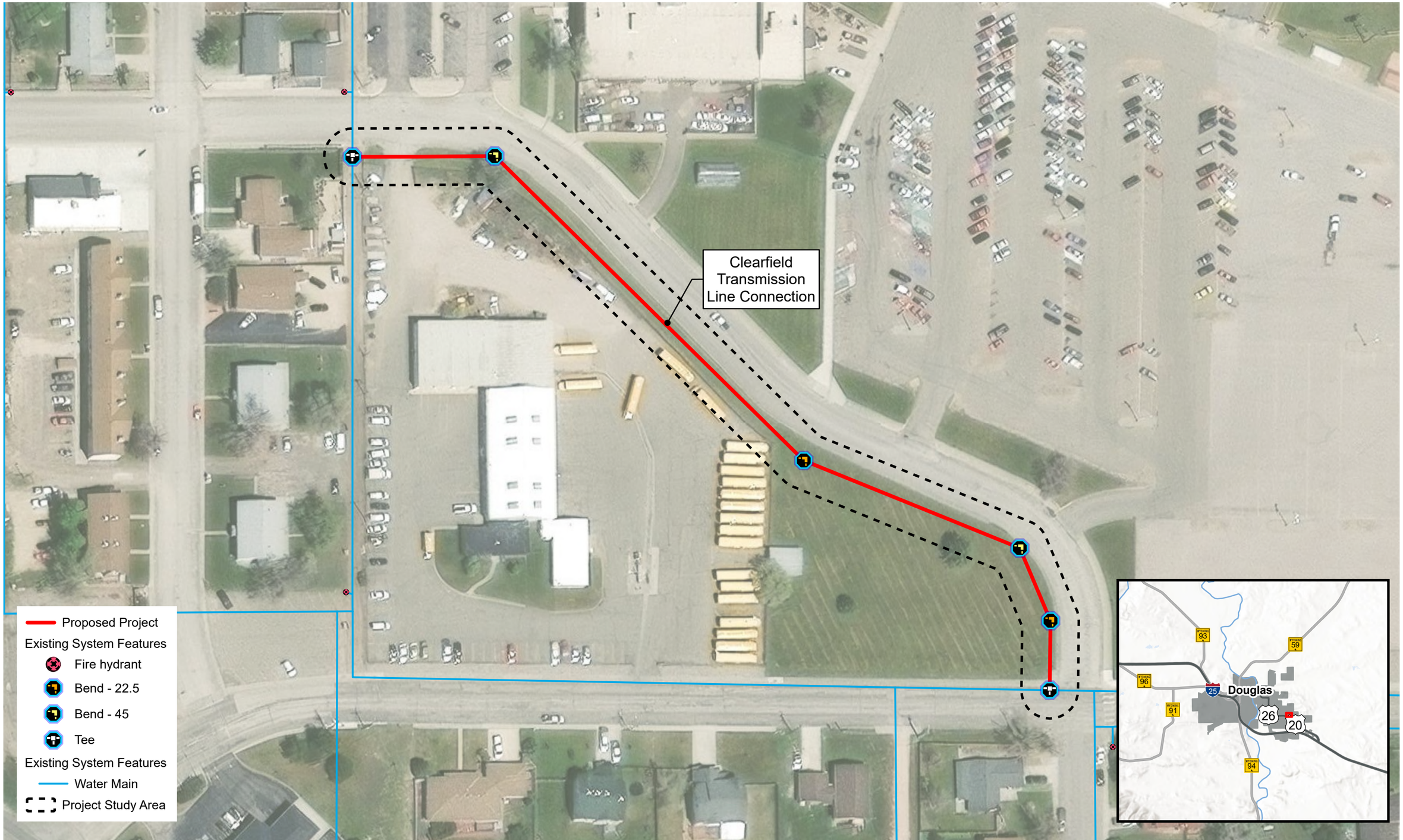
9.6.6 Clearfield Redundant Connection

PROJECT RANK: 12 (6)

PROJECT NARRATIVE:

This project proposes the addition of a redundant transmission line near Douglas High School. This new line would add an additional route for water transmission in the area. It would also provide redundant water delivery to those serviced in the area in the event of an emergency shut off. This configuration of the redundant connection would be a 12-inch, 900-foot transmission line that connects to the main line near Williams Street and Erwin Street, to the water main that goes down Cheyenne Street. The new transmission line is proposed to follow Sanora Avenue and allow water to be moved through the new route.

PROJECT MAP:



PROPOSED PROJECTS
Clearfield Transmission Line Connection
DOUGLAS, WY

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Figure 55. Proposed Map for Clearfield Redundant Connection

COST ESTIMATE:

Table 76. Cost Estimate for Clearfield Redundant Connection

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost	$	-			(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 21,800.00	$ 21,800.00	
Excavation	1100	LS	$ 15.00	$ 16,500.00	
16" Transmission Line (PVC)	900	SY	$ 135.00	$ 121,500.00	
45 Degree Bend 14"	2	CY	$ 3,800.00	$ 7,600.00	
22.5 Degree Bend 14"	2	LF	$ 3,800.00	$ 7,600.00	
14" Gate Valve	1	EA	$ 10,000.00	$ 10,000.00	
Tee	2	EA	$ 6,000.00	$ 12,000.00	
Type I Pipe Bedding	200	CY	$ 55.00	$ 11,000.00	
Backfill	900	CY	$ 35.00	$ 31,500.00	
Cost of Project Components TOTAL (Subtotal #2)	$			239,500.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			24,000.00	
Components + Construction Engineering Costs (Subtotal #3)	$			263,500.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			39,500.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			303,000.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$	24,000.00			
Permitting and Mitigation	$	5,000.00			
Legal Fees (Title of Opinion Only)	$	5,000.00			
Acquisition of Access and Rights of Way	$	2,000.00			
Pre-construction Costs Total (Subtotal #5)	$	36,000.00			(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$	339,000.00			(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$	339,000.00			
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$	263,500.00			

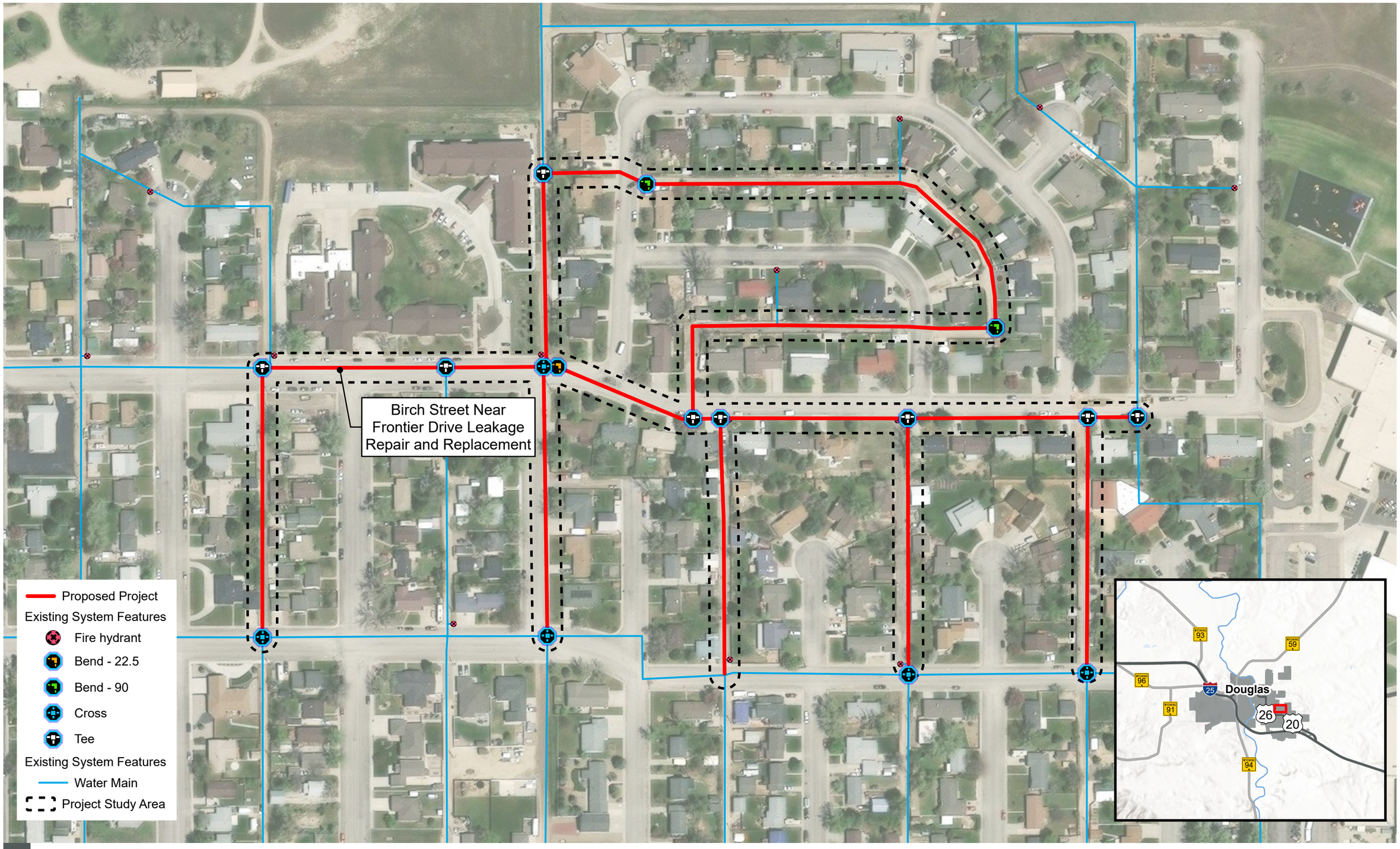
9.6.7 Birch St. & Frontier Dr. Leakage Repair

PROJECT RANK: 13 (7)

PROJECT NARRATIVE:

Near Birch Street and Frontier Drive a large leak was detected in the leakage study. The leak was estimated to be greater than 10 GPM. As in the last project recommendation, the objective of this project is to repair the leak via the replacement of the existing pipe. In addition, surrounding pipes would also be replaced due to them being DIP. This area spans from Birch Street to South 10th Street, to Willams Street, and encompasses the arterial mains that are also connected on Birch Street. This project would also include the cul-de-sac along Village Drive. The total estimated pipe length for this replacement would be 800 feet of 12-inch piping and 2,000 feet of 6-inch piping.

PROJECT MAP:



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Figure 56. Proposed Map for Birch St. and Frontier Dr. Replacement

COST ESTIMATE:

Table 77. Cost Estimate for Birch St and Frontier Dr Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #1)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 111,800.00	$ 111,800.00	
Schedule 1 - 11th to 12th Street					
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	680	SY	$ 10.00	$ 6,800.00	
Excavation	1900	CY	$ 15.00	$ 28,500.00	
Remove Ductile Iron Pipe	1600	LF	$ 10.00	$ 16,000.00	
8" Transmission Line (PVC)	500	LF	$ 45.00	$ 22,500.00	
12" Transmission Line (PVC)	1100	LF	$ 75.00	$ 82,500.00	
Tee	2	EA	$ 6,000.00	$ 12,000.00	
Cross	2	EA	$ 6,000.00	$ 12,000.00	
8" Gate Valve	1	EA	$ 7,000.00	$ 7,000.00	
12" Gate Valve	3	EA	$ 9,000.00	$ 27,000.00	
Type I Pipe Bedding	190	CY	$ 55.00	$ 10,500.00	
Backfill	1800	CY	$ 35.00	$ 63,000.00	
3" Asphaltic Pavement Mat	680	SY	$ 55.00	$ 37,400.00	
Schedule 2 - Village Drive Alley					
Remove Asphalt Paving	1100	SY	$ 10.00	$ 11,000.00	
Excavation	2900	CY	$ 15.00	$ 43,500.00	
Remove Ductile Iron Pipe	2500	LF	$ 10.00	$ 25,000.00	
8" Transmission Line (PVC)	2100	LF	$ 45.00	$ 94,500.00	
12" Transmission Line (PVC)	400	LF	$ 75.00	$ 30,000.00	
8" Gate Valve	2	EA	$ 7,000.00	$ 14,000.00	
12" Gate Valve	2	EA	$ 9,000.00	$ 18,000.00	
Type I Pipe Bedding	90	CY	$ 55.00	$ 5,000.00	
Backfill	2800	CY	$ 35.00	$ 98,000.00	
3" Asphaltic Pavement Mat	1100	SY	$ 55.00	$ 60,500.00	
Schedule 3 - Birch Street to Longview Drive Alley					
Remove Asphalt Paving	1000	SY	$ 10.00	$ 10,000.00	
Excavation	2700	CY	$ 15.00	$ 40,500.00	
Remove Ductile Iron Pipe	2300	LF	$ 10.00	$ 23,000.00	
8" Transmission Line (PVC)	2300	LF	$ 45.00	$ 103,500.00	
8" Gate Valve	7	EA	$ 7,000.00	$ 49,000.00	
Type I Pipe Bedding	400	CY	$ 55.00	$ 22,000.00	
Backfill	2300	CY	$ 35.00	$ 80,500.00	
3" Asphaltic Pavement Mat	1000	SY	$ 55.00	$ 55,000.00	

Cost of Project Components TOTAL (Subtotal #2)	$	1,240,000.00	(Subtotal #2)
Backfill	$	124,000.00	
Components + Construction Engineering Costs (Subtotal #3)	$	1,364,000.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$	204,600.00	
Construction Costs Total (Subtotal #3 + Contingency)	$	1,568,600.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS			
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$	124,000.00	
Permitting and Mitigation	$	5,000.00	
Legal Fees (Title of Opinion Only)	$	5,000.00	
Acquisition of Access and Rights of Way	$	2,000.00	
Pre-construction Costs Total (Subtotal #5)	$	136,000.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$	1,704,600.00	(Subtotal #6)
TOTAL PROJECT COST			
Total Project Cost (Subtotal #1 + Subtotal #6)	$	1,704,600.00	
MATERIALS ONLY TOTAL			
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$	1,364,000.00	

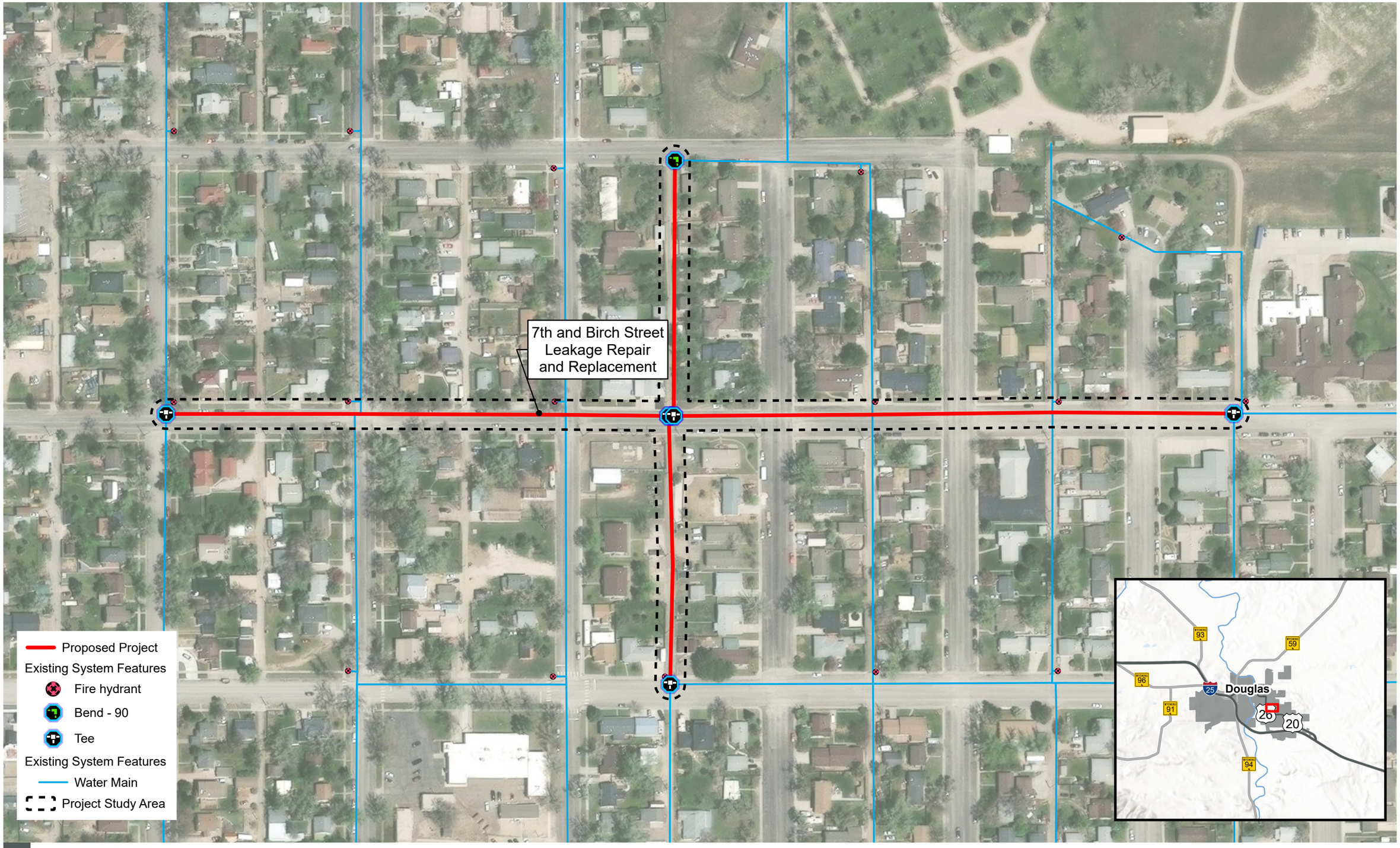
9.6.8 7th & Birch St. Leakage Repair

PROJECT RANK: 15 (8)

PROJECT NARRATIVE:

A small leak was detected at the intersection of 7th Street and Birch Street. This proposed project would replace a DIP with PVC piping. While there is potential for the leak to be remedied by flushing and reclosing the hydrant in this area, it is recommended that the pipe itself be replaced to prevent worsening conditions.

PROJECT MAP:



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Figure 57. Proposed Map for 7th and Birch St. Replacement

COST ESTIMATE:

Table 78. Cost Estimate for 7th and Birch St Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #1)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 58,200.00	$ 58,200.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	1300	SY	$ 10.00	$ 13,000.00	
Excavation	3600	CY	$ 15.00	$ 54,000.00	
Remove Ductile Iron Pipe	3000	LF	$ 10.00	$ 30,000.00	
6" Distribution Main (PVC)	1000	LF	$ 35.00	$ 35,000.00	
12" Transmission Line (PVC)	2000	LF	$ 75.00	$ 150,000.00	
Tee	5	EA	$ 6,000.00	$ 30,000.00	
6" Gate Valve	3	EA	$ 6,000.00	$ 18,000.00	
12" Gate Valve	3	EA	$ 9,000.00	$ 27,000.00	
Type I Pipe Bedding	350	CY	$ 55.00	$ 19,300.00	
Backfill	3250	CY	$ 35.00	$ 113,800.00	
3" Asphaltic Pavement Mat	1300	SY	$ 55.00	$ 71,500.00	
Cost of Project Components TOTAL (Subtotal #2)	$			639,800.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			64,000.00	
Components + Construction Engineering Costs (Subtotal #3)	$			703,800.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			105,600.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			809,400.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			64,000.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			76,000.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$			885,400.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$			885,400.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$			703,800.00	

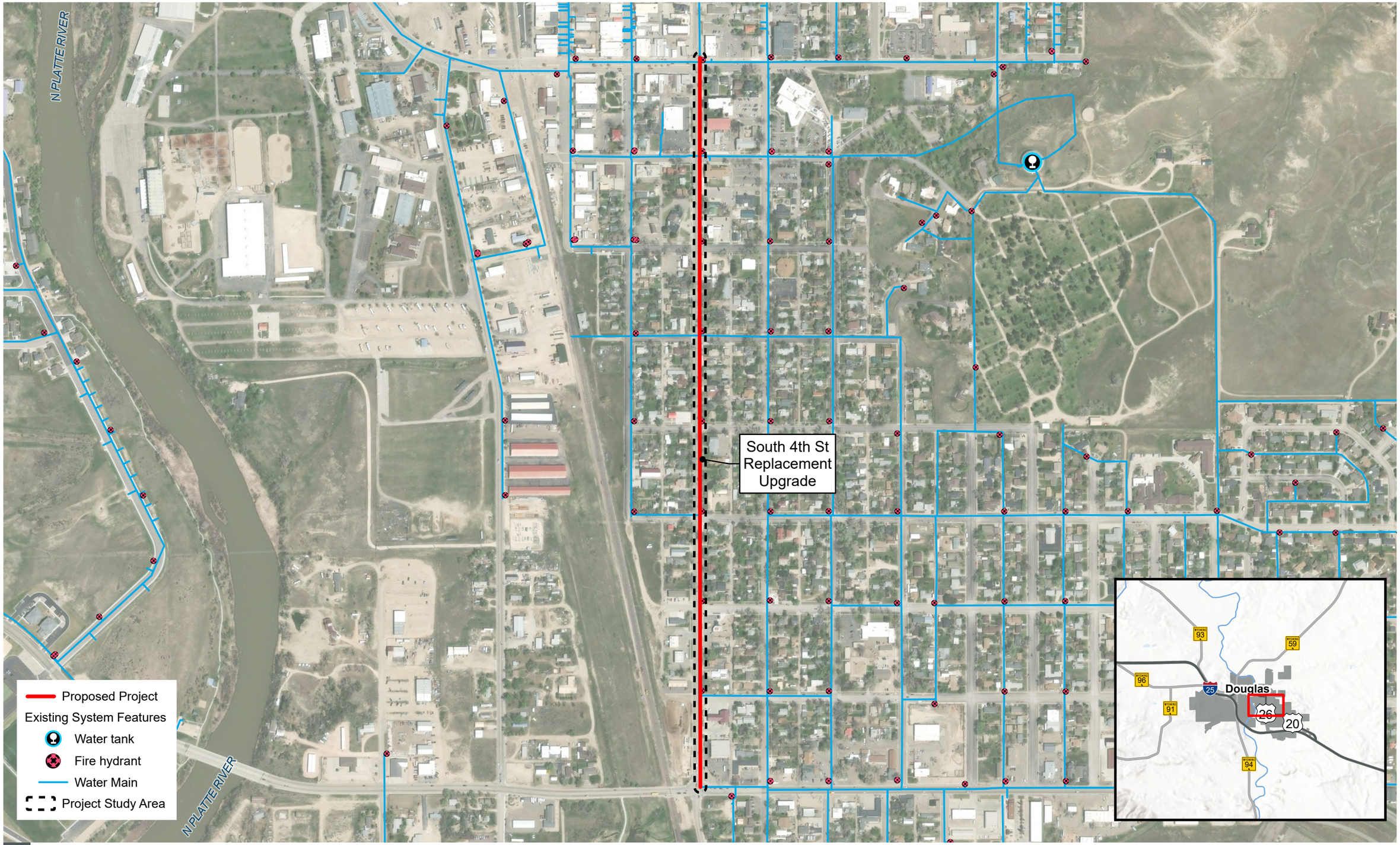
9.6.9 S 4th St. Replacement

PROJECT RANK: 16 (9)

PROJECT NARRATIVE:

This project aims to upgrade the existing water line to a larger size for use within the City. The current lines in place are 14-inch DIP, which are at the end of their functional lifecycle. To ensure proper water delivery and protection from leaks, it is recommended that this line be replace and upsized with 16-inch PVC. This will allow for more water delivery with less risk of water loss due to leaks and breakages. The proposed route of this new pipeline is as follows: a 16-inch PVC transmission lines carry water from E Center Street to a water main on E Richards Street, connecting to the existing City's main water lines. The total length of pipe required for this effort is estimated to be around 1,700 feet of 16-inch PVC pipe.

PROJECT MAP:



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Figure 58. Proposed Map for S 4th St Replacement

COST ESTIMATE:

Table 79. Cost Estimate for S 4th St Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #3 +Subtotal #4)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 44,000.00	$ 44,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	760	SY	$ 10.00	$ 8,000.00	
Excavation	2010	CY	$ 15.00	$ 31,000.00	
16" Transmission Line (PVC)	1690	LF	$ 135.00	$ 229,000.00	
16" Gate Valve	3	EA	$ 11,000.00	$ 33,000.00	
3" Asphaltic Pavement Mat	760	SY	$ 55.00	$ 42,000.00	
Type I Pipe Bedding	490	CY	$ 55.00	$ 27,000.00	
Backfill	1520	CY	$ 35.00	$ 54,000.00	
Cost of Project Components TOTAL (Subtotal #2)	$			488,000.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			48,800.00	
Components + Construction Engineering Costs (Subtotal #3)	$			536,800.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			80,500.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			617,300.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			48,800.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			2,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			57,800.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal #4+ Subtotal #5)	$			675,100.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				675,100.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				536,800.00

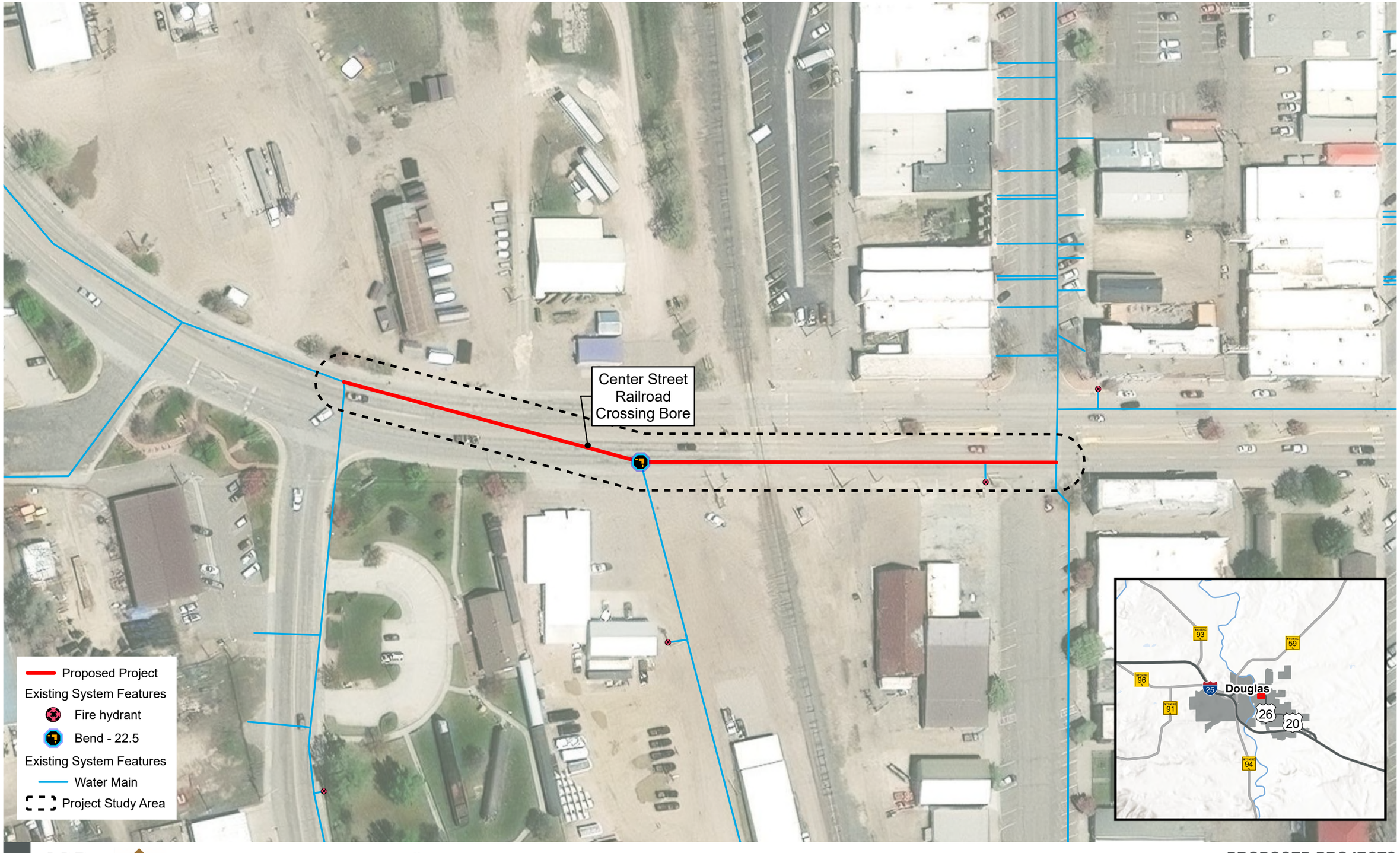
9.6.10 Center St. Waterline Railroad Bore

PROJECT RANK: 17 (10)

PROJECT NARRATIVE:

This project aims to replace the water main that connects 2nd Street to Brownfield Road along Center St. Due to the age and location of this line, it will be more expensive than other projects as the line must be bored under the railway for project completion. The proposed route for this new pipeline is as follows: a 16-inch PVC transmission line will be bored from S 2nd Street to a water main on Brownfield Road, under the existing railroad. The total length of pipe required for this effort is estimated to be around 280 feet of 16-inch PVC pipe.

PROJECT MAP:



PROPOSED PROJECTS
Center Street Railroad Crossing Bore
DOUGLAS, WY

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Figure 59. Proposed Map for Center St Bore

COST ESTIMATE:

Table 80. Cost Estimate for Center St Railroad Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #1)	$	-			(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 28,000.00	$ 28,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	130	SY	$ 10.00	$ 1,300.00	
Excavation	340	CY	$ 15.00	$ 5,100.00	
Directional Bore	280	LF	$ 750.00	$ 210,000.00	
16" Gate Valve	2	EA	$ 11,000.00	$ 22,000.00	
3" Asphaltic Pavement Mat	130	SY	$ 55.00	$ 7,200.00	
Type I Pipe Bedding	90	CY	$ 55.00	$ 5,000.00	
45 Degree Bend 16"	1	EA	$ 4,500.00	$ 4,500.00	
Backfill	250	CY	$ 35.00	$ 8,800.00	
Cost of Project Components TOTAL (Subtotal #2)	$			311,900.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			31,200.00	
Components + Construction Engineering Costs (Subtotal #3)	$			343,100.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			51,500.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			394,600.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			31,200.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			2,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #4)	$			40,200.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal #4+ Subtotal #5)	$			434,800.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$			440,000.00	
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$			343,100.00	

9.6.11 Clearfield Booster Line Replacement

PROJECT RANK: 18 (11)

PROJECT NARRATIVE:

This project aims to replace aging DIP line that connects the Clearfield tank to the distribution system of the City. The proposed route for this new pipeline is as follows: 16-inch PVC transmission lines carry water from S 2nd Street to a water main on Brownfield Road, connecting to the existing City's main water lines. The total length of pipe required for this effort is estimated to be around 280 feet of 16-inch PVC pipe.

PROJECT MAP:

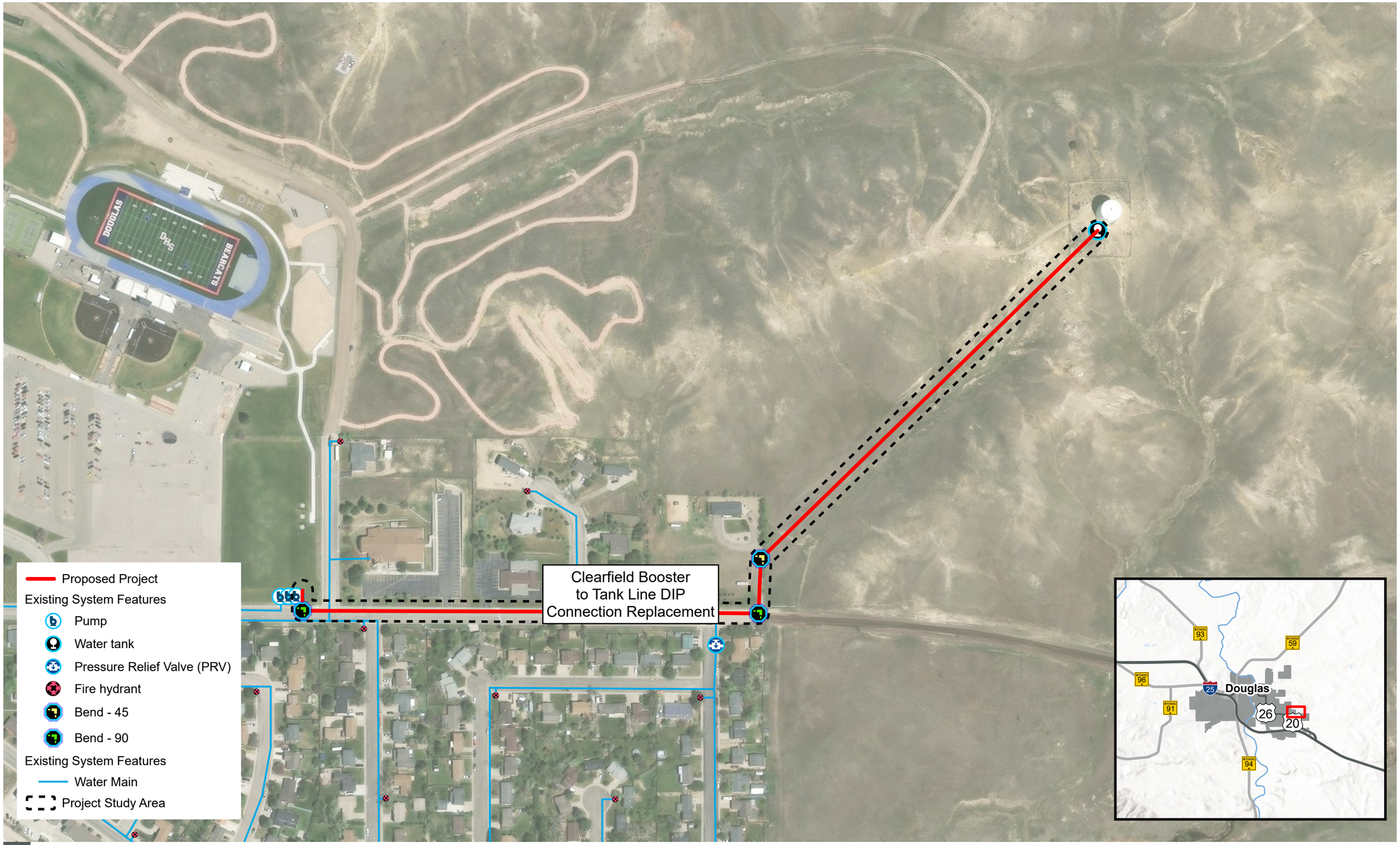


Figure 60. Proposed Map for Clearfield Booster to Tank Replacement

COST ESTIMATE:

Table 81. Cost Estimate for Clearfield Booster to Tank Replacement

CONSTRUCTION COSTS					
TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #1)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 26,000.00	$ 26,000.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	340	SY	$ 10.00	$ 3,400.00	
Excavation	1380	CY	$ 15.00	$ 20,700.00	
14" Transmission Line (PVC)	1160	LF	$ 100.00	$ 116,000.00	
14" Gate Valve	2	EA	$ 10,000.00	$ 20,000.00	
90 Degree Bend 14"	2	EA	$ 3,800.00	$ 7,600.00	
45 Degree Bend 14"	1	EA	$ 3,800.00	$ 3,800.00	
3" Asphaltic Pavement Mat	340	SY	$ 55.00	$ 18,700.00	
Type I Pipe Bedding	300	CY	$ 55.00	$ 16,500.00	
Backfill	1080	CY	$ 35.00	$ 37,800.00	
Cost of Project Components TOTAL (Subtotal #2)	$			290,500.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			29,100.00	
Components + Construction Engineering Costs (Subtotal #3)	$			319,600.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			47,900.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			367,500.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)	$			29,100.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			2,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #4)	$			38,100.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal #4+ Subtotal #5)	$			405,600.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				405,600.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				319,600.00

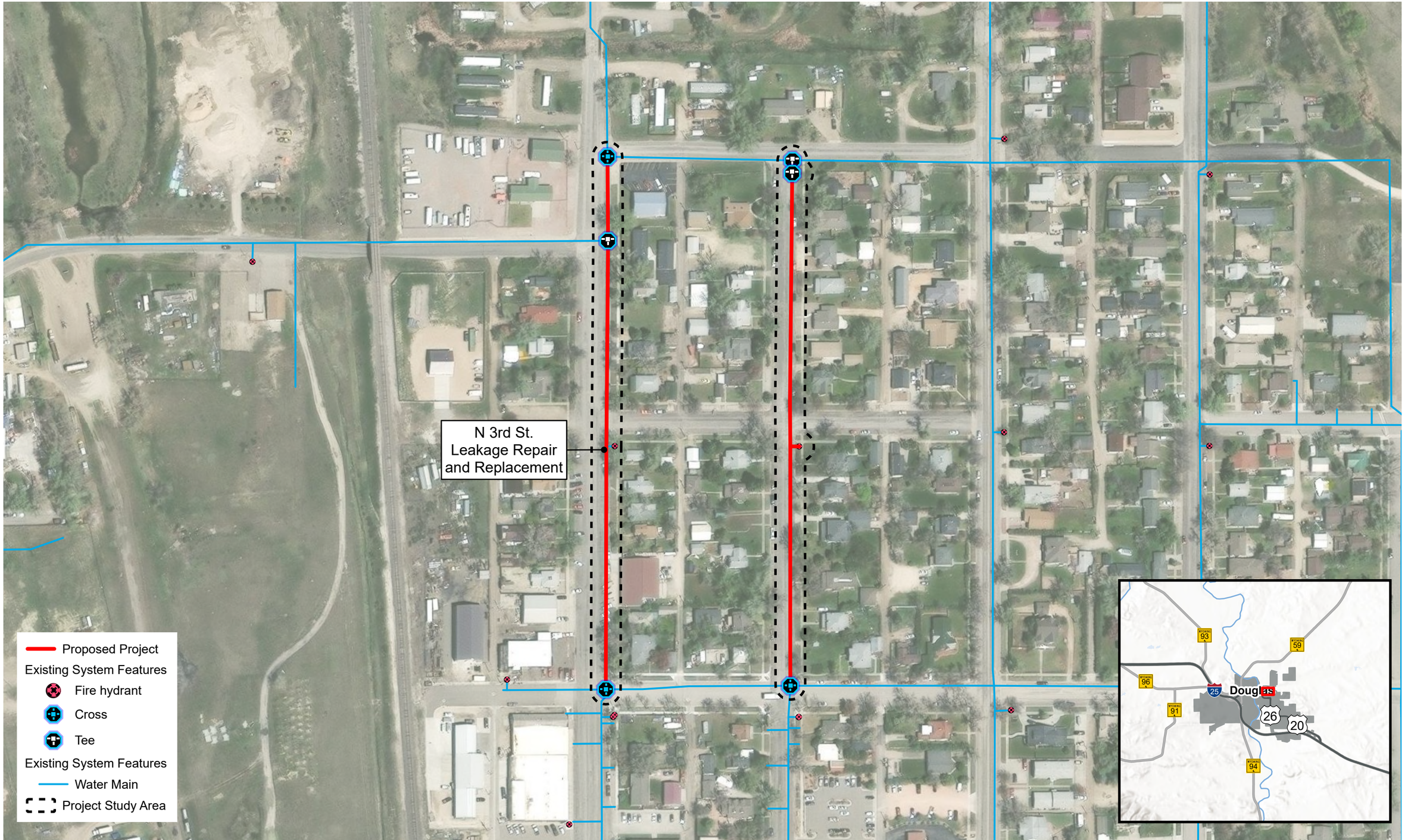
9.6.12 N 3rd St. Leakage Repair

PROJECT RANK: 22 (12)

PROJECT NARRATIVE:

A leak on North 3rd Street between Clay Street and Cedar Street was found in the leakage study conducted as a part of this master plan. The aim of this project is to not only repair the leak but replace the aging Ductile Iron Pipe (DIP) in the region of the leak. Piping within a two-block radius around the leak would be replaced with PVC pipes to ensure the longevity of these lines, rather than combat leaks due to aging infrastructure. This is a proactive rather than mitigative approach.

PROJECT MAP:



PROPOSED PROJECTS

N 3rd St. Leakage Repair and Replacement

DOUGLAS, WY

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Figure 61. Proposed Map for N 3rd St Replacement

COST ESTIMATE:

Table 82. Cost Estimate for N 3rd St Replacement

TOTAL WWDC ELLIGIBLE PROJECT COST					
Total WWDC Elligible Project Cost (Subtotal #4)	$			-	(Subtotal #1)
TOTAL WWDC INELLIGIBLE PROJECT COST					
Itemized Costs of Inelligible Project Components					
Component	Quantity	Units	Unit Cost	Total Cost	Comments
Mobilization, Bonds, Insurance	1	LS	$ 38,900.00	$ 38,900.00	
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00	
Remove Asphalt Paving	900	SY	$ 10.00	$ 9,000.00	
Excavation	2300	CY	$ 15.00	$ 34,500.00	
Remove Ductile Iron Pipe	2000	LF	$ 10.00	$ 20,000.00	
8" Transmission Line (PVC)	1800	LF	$ 45.00	$ 81,000.00	
14" Transmission Line (PVC)	200	LF	$ 100.00	$ 20,000.00	
Tee	3	EA	$ 6,000.00	$ 18,000.00	
Cross	3	EA	$ 6,000.00	$ 18,000.00	
8" Gate Valve	3	EA	$ 7,000.00	$ 21,000.00	
14" Gate Valve	1	EA	$ 10,000.00	$ 10,000.00	
Type I Pipe Bedding	320	CY	$ 55.00	$ 17,600.00	
Backfill	2000	CY	$ 35.00	$ 70,000.00	
3" Asphaltic Pavement Mat	900	SY	$ 55.00	$ 49,500.00	
Cost of Project Components TOTAL (Subtotal #2)	$			427,500.00	(Subtotal #2)
Construction Engineering (Subtotal #2 x 10%)	$			42,800.00	
Components + Construction Engineering Costs (Subtotal #3)	$			470,300.00	(Subtotal #3)
Contingency (Subtotal #3 x 15%)	$			70,500.00	
Construction Costs Total (Subtotal #3 + Contingency)	$			540,800.00	(Subtotal #4)
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #2 x 10%)	$			42,800.00	
Permitting and Mitigation	$			5,000.00	
Legal Fees (Title of Opinion Only)	$			5,000.00	
Acquisition of Access and Rights of Way	$			2,000.00	
Pre-construction Costs Total (Subtotal #5)	$			54,800.00	(Subtotal #5)
Total WWDC Inelligible Project Costs Total (Subtotal # 4+ Subtotal #5)	$			595,600.00	(Subtotal #6)
TOTAL PROJECT COST					
Total Project Cost (Subtotal #1 + Subtotal #6)	$				595,600.00
MATERIALS ONLY TOTAL					
Materials Only Total (Subtotal #2 + (Subtotal #2 x 10%))	$				470,300.00

10.0 Funding Sources

This section involves describing the potential funding sources that can be used for partially eligible or ineligible WWDC projects listed above.

10.1 United States Department of Agriculture (USDA) Rural Utility Services (RUS)

The USDA RUS Division offers programs that help develop drinking water infrastructure and programs through grants and loans. These programs offer aid to any community in a rural area with a population of less than 10,000 people. In accordance with these programs, there are a few that the City of Douglas may find useful in funding opportunities for drinking water needs. These programs are detailed below.

10.1.1 Water & Waste Disposal Loan & Grant Program

According to RUS, this program can be used to fund drinking water systems (United States Department of Agriculture, 2025c). In short, this program can be used to finance new construction or improvements to major components of a drinking water system such as the sources, treatment, and distribution. This program in particular offers low interest loans at up to a 40-year payback period. Each interest rate is determined based on the need of individual projects and the median household income of the area served.

10.1.2 Revolving Funds for Financing Water and Wastewater Projects

This program is like the Water and Waste Disposal program, but the projects this program supports are smaller in scale (United States Department of Agriculture, 2025a) These revolving funds can only be used for pre-development costs as well as short-term capital improvements outside of the regular operating budget. The loans themselves are short-term 10-year loans with a maximum of $200,000.

10.1.3 Circuit Rider Program

This program cannot be used as a funding source, but as a tool to train operators and supervisors on a multitude of topics in relation to running water treatment facilities (United States Department of Agriculture, 2025a). This program can help entities understand the loan application and reporting process in relation to RUS loans.

10.1.4 Environmental Review

All RUS programs must follow Title 7 Subtitle B Chapter XVIII Subchapter H Part 1970 of the Code of Federal Regulations in relation to any funding provided by the UDSA. These include following guidelines set by NEPA, NHPA, and ESA.

10.2 Drinking Water State Revolving Fund

The DWSRF was established in accordance with the SWDA. This revolving fund is used for drinking water projects in any U.S. state on a need basis. The projects that are considered eligible for funding include conventional drinking water projects, lead service line projects, and addressing emerging contaminants (Wyoming Department of Environmental Quality, 2025).

10.2.1 Terms of Loans

The overall loan amount and rate are determined based upon the requested amount and total eligible forgiveness. A traditional project (i.e., planning, treatment, transmission & distribution, source, storage, purchase of existing infrastructure, restructure of existing debt, land acquisition, and other) is eligible for forgiveness of a percentage of the loan amount (Wyoming Department of Environmental Quality, 2025). It was stated in the 2025 IUP that no project received its full eligible forgiveness amount. Loan terms are usually 20 years but can be up to 30.

10.2.2 Project Eligibility

Each project that can receive funding from the DWSRF goes through a criteria selection process to rank it against others that have applied for funding. The criteria include a general category, public health issues, compliance issues, system deficiencies, project needs, affordability, and green project eligibility. Each of these categories are evaluated for the project and a point value is assigned to the category (Wyoming State Lands and Investments Board, 2025c). After the categories have been assigned a point value, the project is ranked against others that have applied.

10.2.3 Environmental Review

For any project receiving DWSRF funding, an environmental review must be completed before any funding is given. These reviews must address laws such as the Clean Air Act, Clean Water Act, and the Migratory Bird Treaty, among others. In addition, the review must include Wyoming-specific programs such as the Greater Sage-Grouse Core Area Protection and the PRRIP. The state will conduct a State Environmental Review Process (SERP), like the federal NEPA process.

10.3 State Lands and Investments Board

The Wyoming Office of State Lands and Investments offers a multitude of grants and loans that could be beneficial funding sources depending upon project needs. Below is a breakdown of grants and loans that may be beneficial funding sources depending on project constraints.

10.3.1 Countywide Consensus Grants

The countywide consensus program can be used to improve public service utilities, cover routine maintenance costs, and facilitate major repairs (Wyoming State Lands

and Investments Board, 2025b). These grants can cover projects as long as 70% of the county population agrees that the project should be funded.

10.3.2 Mineral Royalty Grants

These grants can be used to comply with mandates, provide an essential public service not currently in operation, and respond to emergencies that threaten health or welfare. These grants can cover 50-75% of eligible project costs if all criteria are met (Wyoming State Lands and Investments Board, 2025d). It should be noted that the award could be in the form of a loan rather than a grant. For these conditions, the loan can have a maximum term of 10 years and an interest rate between 0% and the average rate of return of the Permanent Mineral Trust Fund.

10.3.3 Capital Construction Loan Program

The capital construction loan program can be used for renovating and upgrading existing infrastructure as well as planning for and constructing new infrastructure (Wyoming State Lands and Investments Board, 2025a). These loans have terms from 5 to 25 years at a minimum rate of 3%.

10.4 Wyoming Business Council

The Wyoming Business Council offers a business-ready community (BRC) grant and loan program. This program aims to promote economic development by financing infrastructure projects (Wyoming Business Council, 2025). These infrastructure projects include any water related project. As for the terms, the total loan amount may not exceed $5,000,000 and has a maximum interest rate of 1% over a 30-year term.

10.5 City of Douglas Fifth Cent Penny Grant

City of Douglas Fifth Cent Penny Grant is an optional tax voted on by registered voters of Converse County. It is a tax that adds an optional 5th penny to be added to sales tax, increasing the sales tax from 4% to 5% on every dollar. All funds collected are used for municipal projects within the City of Douglas, Converse County, Glenrock, and the Rolling Hills.

11.0 Financial Plan Development

11.1 Background of the Financial Plan

As part of the water master plan development, a financial plan was also developed. This task quantified the anticipated future water system revenues and expenditures. This financial plan was developed with the assumption that future revenues would need to be sufficient to:

- Retire existing water related debt (there is not debt associated with the system);
- 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.

Three different capital planning/funding scenarios were considered as follows.

Scenario 1: Assumes there will be no state, federal or outside funding assistance utilized.

Scenario 2: Assumes that funding for WWDC eligible components will be in the form of a 50% grant from WWDC and a 50% loan from WWDC (4%, 30-year term), and funding for WWDC non-eligible components will only be in the form of sponsor contribution from current or proposed water system revenues.

Scenario 3: Additional funding sources were identified outside of WWDC (primarily DWSRF loans) that the sponsor can pursue to obtain the 50% loan component and to fund WWDC non-eligible components that are necessary for the completion of a Level III construction project.

These are described in more detail in Appendix F. The discussion contained in this Chapter summarizes the financial plan for Scenario 3.

This plan is intended to show future cash flows (both revenue and expenses) and to provide guidance on needed rate increases to fund the capital improvement plan developed. The City provided historical revenue and expense data for Fiscal Years (FY) 2024 and 2025 and prospective revenue and expense data for FY 2026. The expense data provided included a detailed budget for all departments associated

with providing water services. The City also provided the number of water customers by customer class, meter sizes for each customer, and the volume billed for each customer class over a full 12-month period. This information, and the developed Capital Improvements Plan (CIP), were used to build a financial planning model for the water utility. This model forecasts future revenue and expenditures of the utility under varying assumptions including customer growth rates and varying levels and timing of capital improvement spending. The model provides projections for a 20-year period, or until 2045.

To develop a projection of revenues, the current FY25 water utility rates were entered, and the number of customers and volume billed in each customer class were used to calculate the revenue generated for each year of the 20-year period. In addition to rate revenues, the Water Utility also receives revenue from other miscellaneous sources including interest earnings, late charges, bulk water sales, and water plant investment fees. No transfers in from the General Fund or other sources of revenue outside of the rate and fee revenue were included. The financial model allows the water utility rates to be adjusted each year as a percentage increase. The total customer count can also be adjusted each year to reflect population growth and the collection rates can also be adjusted. It should be noted that the customer growth rate was set at 1.3% annually for all customers and the revenue generation was based on an assumed collection rate of 97%.

On the expenditures side, a 3% rate of inflation was assumed on all expenditures, including personnel, maintenance, and supply costs. For capital funding, some projects were assumed to be partially grant funded through WWDC grants and loans, with the remaining portion of those projects being cash funded. Projects that were not eligible for WWDC funding are financed with a combination of cash, market loans, and loans from other sources. It is important to understand that HDR is not acting as the City's municipal financial advisor, and that all assumptions described above were for scenario comparison purposes and estimated rate impacts only.

11.2 Current Utility Assessment

As summarized above, data contained within the rate model to determine revenues and expenses was derived from data provided by the City. This section will provide a more detailed discussion and summary of that data.

Currently, the City charges the water demand charge (or the fixed portion of the monthly water bill) based on water meter size. This is the current best practice for charging water rates within the industry. For the volume portion of the bill, all customers are considered one customer class and charged the same rate per 1,000 gallons of usage. There are two tiers of usage with one rate for all usage under 30,000 gallons per month and a higher rate for use above 30,000 gallons per month.

Many utilities will have separate customer classes for residential and non-residential customers as it is sometimes appropriate to have a different volume rate structure for each customer class depending on their use characteristics. Likewise, many utilities will employ more tiers (normally around four) to help better capture the cost of providing water service to high water users.

The water utility currently appears to have a healthy fund balance with over 24-months of cash on hand. It was assumed the utility entered FY26 with a fund balance of about $11.2 million. Total estimated water expenses for FY26 are $5,028,145 ($1,148,899 in Water Administration, $521,275 in Water Treatment, $630,835 in Water Distribution/Maintenance, $366,388 in Water Customer Service, $540,248 in new debt service expense, and $1,820,500 for cash funded Capital Projects). It should be noted that the expense for Water Administration includes $850,000 of expense for depreciation. While depreciation is a non-cash expense, including it as an expense ensures that the utility is providing for an emergency fund and a maintenance fund meeting the requirements of this study. No transfers to the General Fund are included in the water utility expenses. Total estimated revenue in FY26 is $3,677,723.

There is currently no debt associated with the water utility, so the utility will have capacity to issue debt if needed in the future to fund capital programs, and future debt issues are assumed during the planning period. In the past, capital projects have mostly been paid for with cash. Over the past several years, the utility has been generally neutral with net revenues with some transfers from the general fund to pay for capital projects, meaning increased revenue (i.e. rate increases) will be needed if expenses increase, such as with an increased capital program.

11.3 Proposed Plan (Capital Cost, Distribution and Assignment; Use of Funding Mechanisms, Assumptions, Term/Rate Projections/Fund Summary, Tool Guidance)

As part of the master plan development, $143.8 million of needed capital projects were identified (Table 59). These include projects on the City's existing CIP list and new projects developed as part of this project. Of this total, about $30.1 million is modeled as being cash funded, $27.7 million from market loans, $45.5 million of other loans, $20.2 million from WWDC loans and $20.2 million from WWDC grants (Scenario 3 only – see Appendix F for funding assumptions for other scenarios).

Project Name	Source of Funding	Estimated Project Cost by Year																				CIP Total
		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	
WTP headworks sluice gate replacement	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000
SM Well, WTP Generator Replacement	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 80,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 80,000
Loader: Unit 195: 2022 Yanmar ASV RT-40 Skid	Cash	Cash	$ -	$ -	$ -	$ 3,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,000
Trailer: Unit 192: 2002 MTD Riding Mower	Cash	Cash	$ 70,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 70,000
Water Consulting Services	Cash	Market Loan	$ -	$ -	$ 1,500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,500,000
Addition of slow sand filter	Market Loan	Cash	$ 15,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000
HDR WTP Source Water Study	Cash	Cash	$ 125,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 125,000
Water Treatment Plant Preliminary Design	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 85,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 85,000
Dredging creek below Little Boxelder Spring	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000
LBES membrane roof replacement	Cash	Cash	$ 20,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000
Raw Water system design	Cash	Cash	$ -	$ -	$ 180,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 180,000
Replace MCC VFD for SM #1 Well	Cash	Cash	$ 565,000	$ 575,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,140,000
Roughing filter installation	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 465,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 465,000
SCADA system replacement	Cash	Cash	$ -	$ -	$ 205,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 205,000
Sheep Mountain well pump & motor replacement	Cash	Cash	$ 57,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 57,500
SM Well #1 Surge Tank	Cash	Cash	$ -	$ -	$ -	$ 80,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 80,000
WTP clearwell cleaning and disinfection	Cash	Cash	$ -	$ -	$ 320,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 320,000
WTP motor controller and harmonic filter replacement	Cash	Cash	$ 180,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 180,000
WTP SCADA PC Rockwell software conversion	Cash	Cash	$ -	$ 25,000	$ 275,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 300,000
WTP sewage lift station replacement	Cash	Cash	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 60,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 110,000
Rebuild Cla-Val Flow control valves on springline	Cash	Cash	$ 60,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 60,000
Replace Chalk Buttes Booster	Cash	Cash	$ 478,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 478,000
Replace WTP waterline to Grant St	Cash	Cash	$ -	$ -	$ -	$ -	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000
SM #1 Well roof replacement	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ 90,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 90,000
WTP Air Conditioner replacement	Cash	Cash	$ 110,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 110,000
Valve Replacement on Well Line	Cash	Cash	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,000
Buy Land for Cemetery Tank Replacement	Cash	Cash	$ -	$ 592,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 592,000
N 4th Street: to Antelope Creek Bridge	Cash	Market Loan	$ 1,100,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100,000
N 8th Street from Center to Cedar	Market Loan	Market Loan	$ 477,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 477,000
S 2nd & 3rd St. With Street Scape	Market Loan	Market Loan	$ 1,265,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,265,000
S 4th Street	Market Loan	Market Loan	$ 710,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 710,000
N 3rd St. Cedar to Clay	Market Loan	Market Loan	$ 704,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 704,000
Pine Street - 3rd to 6th	Market Loan	Market Loan	$ -	$ 667,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 667,000
10th St. Cul de Sac	Market Loan	Cash	$ -	$ -	$ 345,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 345,000
Bandera Ave. Services Only	Cash	Cash	$ -	$ -	$ -	$ 746,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 746,000
Bar Two	Cash	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 431,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 431,250
Center St: S 7th	Cash	Market Loan	$ -	$ -	$ -	$ -	$ 508,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 508,000
Charles St. N 6th, N 7th & Charles St.	Market Loan	Cash	$ -	$ -	$ -	$ -	$ 115,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 115,000
Cody St.	Cash	Cash	$ -	$ -	$ -	$ -	$ 345,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 345,000
Durange: Park Dr. to Mesa Dr	Cash	Cash	$ -	$ 350,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 350,000
Green River	Cash	Market Loan	$ -	$ -	$ -	$ 1,080,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,080,000
Hamilton St: 6th to 12th	Market Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,000
Highland Court	Cash	Market Loan	$ 286,000	$ 2,196,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,482,000
I25 & North Platte River - Engineering Only	Market Loan	Market Loan	$ -	$ -	$ 1,058,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,058,000
Jefferson - Richards to Fetterman	Market Loan	Cash	$ -	$ -	$ 202,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 202,000
Kimball St.	Cash	Market Loan	$ 220,500	$ 1,690,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,911,000
Law Enforcement Booster Station	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,035,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,035,000
N 2nd & N 3rd St. Cedar to Clay	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ 1,035,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,035,000
N Windriver Riverbend to Sweetwater	Market Loan	Cash	$ -	$ -	$ -	$ 230,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,000
North Fork	Cash	Cash	$ -	$ -	$ -	$ -	$ 517,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 517,500
Riverbend Dr - Shoshone to Bighorn	Cash	Market Loan	$ 99,000	$ 761,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 860,000
S 5th St - Lead water service replacement Center to Pine	Market Loan	Market Loan	$ -	$ -	$ -	$ 575,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 575,000
S 5th St - Pine to Birch	Market Loan	Cash	$ -	$ -	$ 365,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 365,000
S 6th St: Birch to Hamilton	Cash	Market Loan	$ 286,000	$ 2,196,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,482,000
Williams St: Cheyenne to Birch	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ 835,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 835,000
Windriver Drive: Carver to Leal	Market Loan	Market Loan	$ -	$ -	$ 16,897,900	$ 16,897,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 33,795,800
Douglas WTP	DWSRF Loan	Market Loan	$ 1,578,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,578,400
Exploratory Well in Fort Union	Grant	Market Loan	$ 1,578,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,578,400
Exploratory Well in Fort Union	WWDC Loan	Market Loan	$ -	$ 4,869,350	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,869,350
Fort Union Transmission Piping	Grant	Market Loan	$ -	$ 4,869,350	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,869,350
Fort Union Transmission Piping	WWDC Loan	Cash	$ -	$ -	$ 152,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 152,500
Cemetary Tank 2	Cash	Market Loan	$ -	$ -	$ 3,297,150	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,297,150
Cemetary Tank 2	Grant	Market Loan	$ -	$ -	$ 3,297,150	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,297,150
Cemetary Tank 2	WWDC Loan	Market Loan	$ -	$ -	$ -	$ 637,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 637,600
Richard St. Connect	Market Loan	Market Loan	$ -	$ -	$ -	$ 1,332,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,332,700
South River Crossing - I25	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ 575,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 575,900
Cemetary to Cheyenne Transmission Line	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ 583,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 583,600
Jefferson Leakage Repair	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ 2,161,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,161,100
Cemetery Tank Main Connect	DWSRF Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ 1,083,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,083,000

Cemetery Tank Main Connect	Grant	Market Loan	$ -	$ -	$ -	$ -	$ -	$ 1,083,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,083,000
Cemetery Tank Main Connect	WWDC Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ 288,550	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 288,550
Relining of Orpha Tank	Grant	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ 288,550	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 288,550
Relining of Orpha Tank	WWDC Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,500,000
Water Rights Purchases	DWSRF Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 339,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 339,000
Clearfield Transmission Line	Cash	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,704,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,704,600
Birch St Frontier Drive Leakage Repair	Market Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 414,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 414,400
Cemetary Tank Irrigation Conversion	Cash	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 885,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 885,400
7th & Birch St Leakage Repair	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 675,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 675,100
S 4th Street Replacement Upgrade to 16"	Market Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 434,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 434,800
Center Street Railroad Crossing Bore WL	Market Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 405,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 405,600
Clearfield Booster to Tank Line DIP Upgrade	Cash	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 595,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 595,600
N 3rd Streeet Leakage Repair	Market Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 325,000
Storage Water Contracts	Cash	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,928,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,928,900
Exploratory Well in Fox Hills	Grant	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,928,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,928,900
Exploratory Well in Fox Hills	WWDC Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,700
Fox Hills Transmission Piping	Grant	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,700
Fox Hills Transmission Piping	WWDC Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,050,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,050,000
Western Cable Well TL	DWSRF Loan	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,327,300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,327,300
Western Cable Well TL	Grant	Market Loan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,327,300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,327,300
Western Cable Well TL	WWDC Loan	Cash	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000	$ 2,100,000	$ 2,205,000	$ 2,315,250	$ 2,431,013	$ 2,552,563	$ 2,680,191	$ 16,284,017		
Other Water Projects	Cash	$ -	$ 10,124,800	$ 18,841,200	$ 28,094,700	$ 21,582,200	$ 3,510,000	$ 5,362,100	$ 6,287,100	$ 2,729,850	$ 2,514,700	$ 5,964,000	$ 9,762,400	$ 9,729,600	$ 2,025,000	$ 2,125,000	$ 2,230,000	$ 2,340,250	$ 2,456,013	$ 2,577,563	$ 2,705,191	$ 140,961,667		
Totals		$ -	$ 20,159,600	$ 37,682,400	$ 56,189,400	$ 43,164,400	$ 7,020,000	$ 10,724,200	$ 12,574,200	$ 5,459,700	$ 5,029,400	$ 11,928,000	$ 19,524,800	$ 19,459,200	$ 4,050,000	$ 4,250,000	$ 4,460,000	$ 4,680,500	$ 4,912,025	$ 5,155,126	$ 5,410,383	$ 281,833,334		

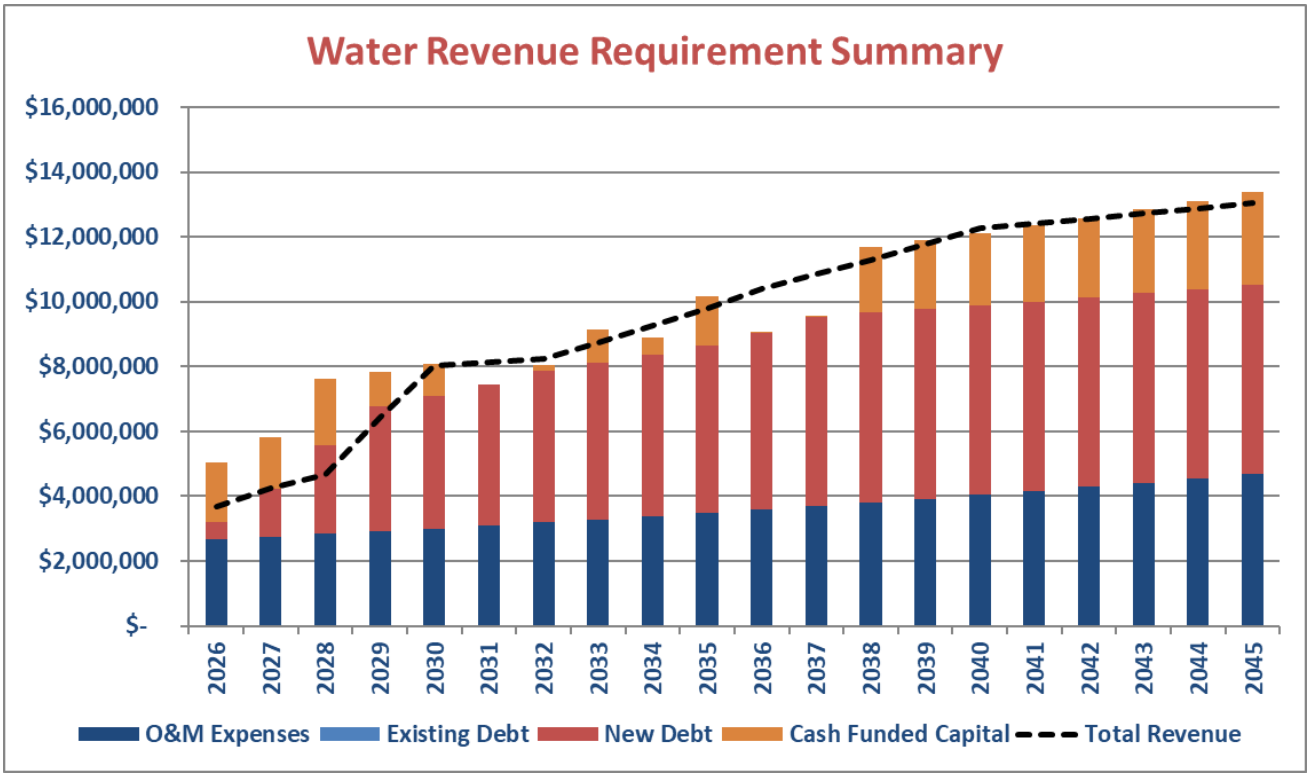


Figure 62. Water Revenue Requirements

Table 84. Water Revenue Requirements Breakdown

Item		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
BEGINNING FUND BALANCE		$ 11,219,846	$ 9,869,424	$ 8,274,010	$ 5,331,791	$ 3,924,533	$ 3,862,480	$ 4,555,378	$ 4,754,756	$ 4,356,842	$ 4,721,380	$ 4,382,357	$ 5,720,938	$ 6,993,574	$ 6,606,005	$ 6,474,803	$ 6,612,204	$ 6,671,884	$ 6,646,696	$ 6,529,135	$ 6,311,320
REVENUES		$ 3,677,723	$ 4,231,492	$ 4,665,672	$ 6,433,580	$ 8,029,837	$ 8,128,528	$ 8,228,501	$ 8,723,534	$ 9,250,064	$ 9,809,762	$ 10,407,788	$ 10,839,196	$ 11,289,761	$ 11,760,219	$ 12,251,336	$ 12,404,907	$ 12,560,473	$ 12,718,062	$ 12,877,700	$ 13,039,412
EXPENDITURES	O&M Expenses	$ 2,667,397	$ 2,747,419	$ 2,829,841	$ 2,914,737	$ 3,002,179	$ 3,092,244	$ 3,185,012	$ 3,280,562	$ 3,378,979	$ 3,480,348	$ 3,584,759	$ 3,692,301	$ 3,803,070	$ 3,917,162	$ 4,034,677	$ 4,155,718	$ 4,280,389	$ 4,408,801	$ 4,541,065	$ 4,677,297
	Debt Service Requirements																				
	Debt Service - Existing Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Debt Service - Proposed New Debt	$ 540,248	$ 1,487,487	$ 2,733,550	$ 3,867,102	$ 4,082,211	$ 4,343,386	$ 4,669,112	$ 4,815,636	$ 4,987,147	$ 5,157,837	$ 5,459,449	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259
	Total Debt Service	$ 540,248	$ 1,487,487	$ 2,733,550	$ 3,867,102	$ 4,082,211	$ 4,343,386	$ 4,669,112	$ 4,815,636	$ 4,987,147	$ 5,157,837	$ 5,459,449	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259	$ 5,849,259
	Transfers																				
	Operating Transfers	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Cash CIP/ Other Capital Transfers	$ 1,820,500	$ 1,592,000	$ 2,044,500	$ 1,059,000	$ 1,007,500	$ -	$ 175,000	$ 1,025,250	$ 519,400	$ 1,510,600	$ 25,000	$ 25,000	$ 2,025,000	$ 2,125,000	$ 2,230,000	$ 2,340,250	$ 2,456,013	$ 2,577,563	$ 2,705,191	$ 2,839,201
	Total Transfers	$ 1,820,500	$ 1,592,000	$ 2,044,500	$ 1,059,000	$ 1,007,500	$ -	$ 175,000	$ 1,025,250	$ 519,400	$ 1,510,600	$ 25,000	$ 25,000	$ 2,025,000	$ 2,125,000	$ 2,230,000	$ 2,340,250	$ 2,456,013	$ 2,577,563	$ 2,705,191	$ 2,839,201
	Total Expenditures	$ 5,028,145	$ 5,826,906	$ 7,607,892	$ 7,840,838	$ 8,091,890	$ 7,435,630	$ 8,029,123	$ 9,121,447	$ 8,885,526	$ 10,148,785	$ 9,069,207	$ 9,566,560	$ 11,677,329	$ 11,891,421	$ 12,113,936	$ 12,345,227	$ 12,585,661	$ 12,835,623	$ 13,095,515	$ 13,365,757
NET REVENUE		(1,350,422)	(1,595,414)	(2,942,219)	(1,407,258)	(62,053)	692,897	199,378	(397,914)	364,538	(339,023)	1,338,581	1,272,636	(387,568)	(131,202)	137,400	59,680	(25,187)	(117,561)	(217,816)	(326,344)
ENDING FUND BALANCE		$ 9,869,424	$ 8,274,010	$ 5,331,791	$ 3,924,533	$ 3,862,480	$ 4,555,378	$ 4,754,756	$ 4,356,842	$ 4,721,380	$ 4,382,357	$ 5,720,938	$ 6,993,574	$ 6,606,005	$ 6,474,803	$ 6,612,204	$ 6,671,884	$ 6,646,696	$ 6,529,135	$ 6,311,320	$ 5,984,976

Due to the limited growth rate of the utility, most of the increased revenue needed will likely come from rate increases. As modeled, large rate increases are needed in the early years of the planning period to fund large projects such as the Douglas WTP. These large rate increases early on are the result of several projects with a large capital expense with a need for funding during the first five years of the planning period. Most notably is the Douglas WTP project with a planned cost of almost $34 million. It is assumed that this project would be debt funded; however, this still causes the revenue requirement to increase quickly in the first five years of the planning period, resulting in the large rate increases shown. For example, the projected debt service expense will be over $4.0 million per year by 2030. While fund balance is being used to help lessen the rate impacts, this large increase in expenses is driving the need for large rate increases early on. Later in the planning period, most modeled rate increases are between 3% and 5% to account for inflationary increases in operations and maintenance costs as well as cash funding some smaller improvements to the water system.

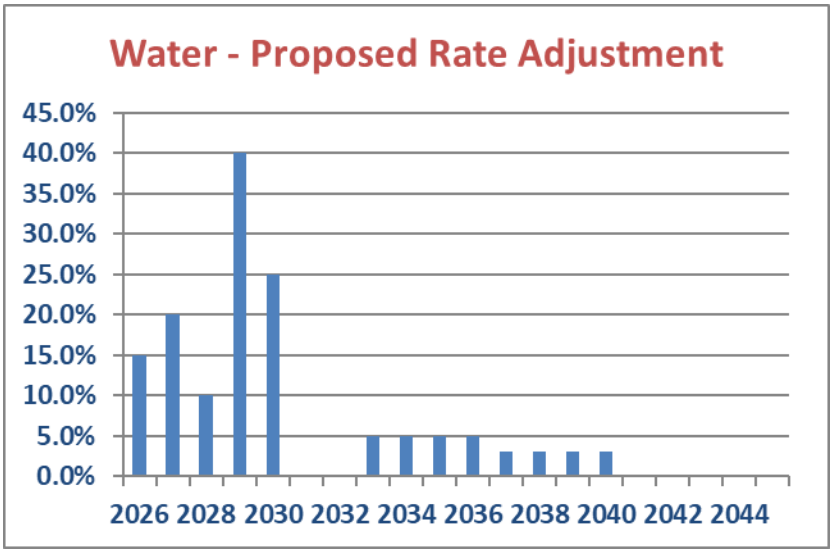


Figure 63. Water Rate Adjustments (Proposed)

The cumulative rate increase needed over the planning period to fund all projects and other expenses associated with the utility is 142%.

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Appendix A- Water Rights

Includes Permits, Certificates, and Orders relating to the City of Douglas water sources (Little Box Elder Spring, Sheep Mountain Well, and North Platte River)

Carey Little Box Elder No.1 Ditch as Changed to Douglas Pipeline

Territorial Permit 3334
Certificate of Appropriation
Priority Date: 5/20/1885
Source: Little Box Elder Spring

2/423
Issued 7/10/99

Proof 3334

1-299

THE STATE OF WYOMING.

CERTIFICATE OF APPROPRIATION OF WATER.

Whereas, J. M. Carey and R. Davis Carey

of Converse County, Wyoming, has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Little Box Elder Creek tributary of Box Elder Creek

through the Carey Little Box Elder Not. Ditch for Irrigation & Stock purposes

Now Know Ye, That the Board of Control, under the provisions of Chapter 8 of the Session Laws of 1890-91, entitled "An Act Providing for the Supervision and Use of the Waters of the State," approved December 22nd, 1890, has, by an order dated the 19th day of October A. D. 1898, determined and established the priority and amount of appropriation as follows:

Name of Appropriator: J. M. Carey and R. Davis Carey; Post-office Address, Cheyenne Wyoming

Number of Priority: First Appropriation, 6 (General — on Box Elder Creek & tributaries); Second Appropriation, ; Third Appropriation, (on Little Box Elder Creek 2)

Amount of First Appropriation, 1.58 cubic feet per second; Second Appropriation, cubic ft. per sec.; Third Appropriation, cubic ft. per sec.

Date of First Appropriation, May 20th 1885; Second Appropriation, ; Third Appropriation,

Description of Land to be Irrigated: One Hundred and Eleven (111) acres.: Being Sixteen (16) acres in S.E.¼ of S.E.¼ - Thirty one (31) acres in N.E.¼ of S.E.¼ - Thirty five (35) acres in N.W.¼ of S.E.¼ - Twenty Six (26) acres in S.E.¼ of N.E.¼ of Sec. Twenty three (23) - Three (3) acres in S.W.¼ of N.W.¼ of Sec. Twenty four (24) T. 33 N. R. 74 W.

The right to water hereby confirmed and established is limited to irrigation & stock purposes and the use is restricted to the place where acquired and to the purpose for which acquired: rights for irrigation not to exceed one cubic foot per second for each seventy acres watered.

The right to water hereby established for stock purposes not to exceed Two (.02) one hundredths of a cubic foot per second

For change of this right to preferred use for municipal purposes, See O.R. 6, P. 354.
and for change in point of diversion and means of conveyance to the Douglas Pipe Line, 3-32-74.

In Testimony Whereof, I, Elwood Mead, President of the State Board of Control, have hereunto set my hand this 19th day of October A. D. 1898, and caused the seal of said Board to be hereunto affixed.

ATTEST: James A Johnston Secretary. Elwood Mead President.

By W. H. Gilcrest Deputy

Little Box Elder Ditch No.4 as Changed to Douglas Pipeline

Territorial Permit 3338
Certificate of Appropriation
Priority Date: Spring 1885
Source: Little Box Elder Spring

3338

THE STATE OF WYOMING

CERTIFICATE OF APPROPRIATION OF WATER

CERTIFICATE RECORD NO. 32 PAGE 102

WHEREAS, F. G. McCrossin has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Box Elder Spring tributary of Little Box Elder Creek through the Little Box Elder No. 4 Ditch under Permit No. Terr. for irrigation of the lands herein described, lying and being in Converse County, Wyoming, and for domestic purposes.

NOW KNOW YE, That the Board of Control, under the provisions of Division 1, Title 9, Chapters 10 and 14 of the Revised Statutes of Wyoming, 1899, has, by an order duly made and entered on the 26th day of November, A. D. 1910, in Order Record No. 4 Page 459, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator F. G. McCrossin; Postoffice Address Inez, Wyoming; Amount of Appropriation .87 cu. ft. per. sec.; Date of Appropriation Spring, 1885; Description of land to be irrigated and for which this appropriation is determined and established; Total Acreage Sixty-one (61) acres.

9 A. SW¼ NE¼ Sec. 3, Tp. 32 N. R. 74 W.
18 A. SE¼ NE¼ " " " " " " " "
18 A. Lot 4, Sec. 2, " " " " " "
16 A. Lot 3, " " " " " " " "
61 A. Total acreage.

For change of this right to preferred use for municipal purposes, See O.R. 6 P. 354.

The right to water hereby confirmed and established is limited to irrigation and domestic purposes, and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot per second for each seventy acres of land for which appropriation is herein determined and established.

IN TESTIMONY WHEREOF, I, CLARENCE T. JOHNSTON, President of the State Board of Control, have hereunto set my hand this 21st day of JAN, A. D. 1911, and caused the seal of said Board to be hereunto affixed.

ATTEST: LOUISE JABELMANN, *Secretary.*

Clarence T. Johnston, *President.*

E.S No. 1 Ditch as Changed to Douglas Pipeline

Territorial Permit 3332
Certificate of Appropriation
Priority Date: 1879
Source: Little Box Elder Spring

2/473

Proof 3331

THE STATE OF WYOMING.

1- 298

CERTIFICATE OF APPROPRIATION OF WATER.

Issued 4/7-1900.

Whereas, Edward D. Johnson

of Converse County, Wyoming, has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Little Box Elder Creek tributary of Box Elder Creek through the E. D. No. 1 Ditch for Irrigation

Now Know Ye, That the Board of Control, under the provisions of Chapter 8 of the Session Laws of 1890-91, entitled "An Act Providing for the Supervision and Use of the Waters of the State," approved December 22nd, 1890, has, by an order dated the 19" day of October A. D. 1898, determined and established the priority and amount of appropriation as follows:

Name of Appropriator, Edward D. Johnson; Post-office Address, Careyhurst, Wyoming

Number of Priority: First Appropriation, 2 (General-On Box Elder Creek + tributaries); Second Appropriation, ____; Third Appropriation, ____

" " " : " " (Little Box Elder Creek),

Amount of First Appropriation, 1.10 cubic feet per second; Second Appropriation, ____ cubic ft. per sec.; Third Appropriation, ____ cubic ft. per sec.

Date of First Appropriation, 1879; Second Appropriation, ____; Third Appropriation, ____

Description of Land to be Irrigated: Seventy Seven (77) acres: Being Ten (10) acres in S.E.¼ of S.E.¼ - Five (5) acres in S.W.¼ of S.E.¼ Twelve (12) acres in N.E.¼ of S.E.¼ - Twenty (20) acres in N.W.¼ of S.E.¼ - Thirty (30) acres in S.W.¼ of N.E.¼ of Sec. Twenty five (25) T 33 N. R. 74 W.

The right to water hereby confirmed and established is limited to irrigation ____ and the use is restricted to the place where acquired and to the purpose for which acquired: rights for irrigation not to exceed one cubic foot per second for each seventy acres watered.

For change of this right to preferred use for municipal purposes, and for change in point of diversion and means of conveyance to the Douglas Pipe Line, 3-32-74. } See O. R. 6, P. 354.

In Testimony Whereof, I, Elwood Mead, President of the State Board of Control, have hereunto set my hand this 19" day of October, A. D. 1898, and caused the seal of said Board to be hereunto affixed.

ATTEST: James A Johnston Secretary. Elwood Mead President.

By W.M. Gierst Deputy

E.S No. 2 Ditch as Changed to Douglas Pipeline

Territorial Permit 3332
Certificate of Appropriation
Priority Date: 1879
Source: Little Box Elder Spring

2/473 S

Issued 4/7-1900

Proof 3332

1-298

THE STATE OF WYOMING.

CERTIFICATE OF APPROPRIATION OF WATER.

Whereas, Edward D. Johnson of Converse County, Wyoming, has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Little Box Elder Creek tributary of Box Elder Creek through the E. S. No 2 Ditch for Irrigation

Now Know Ye, That the Board of Control, under the provisions of Chapter 8 of the Session Laws of 1890-91, entitled "An Act Providing for the Supervision and Use of the Waters of the State," approved December 22nd, 1890, has, by an order dated the 19th day of October A. D. 1898, determined and established the priority and amount of appropriation as follows:

Name of Appropriator, Edward D Johnson; Post-office Address, Careyhurst, Wyoming

Number of Priority: First Appropriation, 2d (General- on Box Elder Creek + tributaries); Second Appropriation, ; Third Appropriation,

" " " " " " 1, on Little Box Elder Creek

Amount of First Appropriation, 0.36 cubic feet per second; Second Appropriation, cubic ft. per sec.; Third Appropriation, cubic ft. per sec.

Date of First Appropriation, 1879; Second Appropriation, ; Third Appropriation,

Description of Land to be Irrigated: Twenty five (25) acres: Being Five (5) acres in S.E¼ of S.E¼ Ten (10) acres in N.E¼ of S.E¼ Ten (10) acres in S.E¼ of N.E¼ of Sec. Twenty five (25) T 33 N. R 74 W.

The right to water hereby confirmed and established is limited to irrigation and the use is restricted to the place where acquired and to the purpose for which acquired: rights for irrigation not to exceed one cubic foot per second for each seventy acres watered.

For change of this right to preferred use for municipal purposes, See O. R. 6 P. 354.
and for change in point of diversion and means of conveyance to the Douglas Pipe Line, 3-32-74.

In Testimony Whereof, I, Elwood Mead, President of the State Board of Control, have hereunto set my hand this 19th day of October, A. D. 1898, and caused the seal of said Board to be hereunto affixed.

ATTEST: James A Johnston Secretary. Elwood Mead President.

By W. M. Gilcrist Deputy

Enlargement of Little Box Elder Ditch Co. No. 4 Ditch as Changed to Douglas Pipeline

Permit 2335.0E
Priority Date: 4/20/1910
Source: Little Box Elder Spring

148 2335 Enl. Completed

Cert. Record 34 P. 254 Ac. 6

Cert. Record 34 P. 253 Ac. 8.5

Application for a Permit to Divert and

The S. A. Bristol Co. Printers and Binders, Cheyenne

Proof submitted. NOV 1912

Water Division No. 1 District No.

ENLARGEMENT OF THE Little Bid Elder Ditch No. 4

I, H. K. Burket, of Lincoln, County of Lancaster, State of Nebraska, being duly sworn according to law, upon my oath say:

1. The location and description of the ditch to be enlarged is as follows:

2. The headgate is situated in the NW¼SE¼ of Section 3, Township 32, Range 74

3. Said ditch is 1¼ miles long and passes through the following lands (give legal subdivisions) the same being correctly shown on the map accompanying this application:

NW¼SE¼, SW¼NE¼, E½NE¼, of Sec. 3, N½NW¼ of Sec. 2, all in T. 32, R. 74

4. The dimensions of said ditch are: Width on top (at water-line) 6 feet; width on bottom 4 feet; depth of water 1 feet; grade 5.28 feet per mile.

5. Said ditch now serves to irrigate the following described land:

9 acres in SW¼NE¼, 18---- acres in SE¼NE¼ Sec. 3, 18 acres in Lot 4, 16 acres in Lot 3, Sec. 2 T. 32 R. 74

6. The total area now irrigated from said ditch being Sixty One (61) acres.

7. Application is hereby made for permission to enlarge or extend the use of water through the above named and described ditch and to divert and appropriate the water of the State as follows:

1. The name of the applicant Green Valley Land & Live Stock Co.
2. The postoffice address of the applicant Douglas, Wyo.
3. The use to which the water is to be applied is Irrigation and Stock Purposes
4. The name of the ditch or canal is Little Box Elder Ditch No. 4

*5. The source of the proposed appropriation is Spring and Reservoir and the head of the proposed extension is located West 1263 feet from the SE corner of Section 35, Township 33, Range 74

6. The said ditch or canal as enlarged is to be 1 5/8 miles long and to pass through the following lands (give sections, townships and ranges): same as described for the original ditch above and in addition the S½SE¼ of Sec. 35 T. 33, R. 74

7. The dimensions of said ditch are to be: (a) [At headgate] Width on top (at water-line) 6 feet; width on bottom 4 feet; depth of water 1 feet; grade 5.28 feet per mile.

(b) Give dimensions at each point where reduced in size, stating miles from headgate: [At 1¼] width on top (at water-line) 4 feet; width on bottom 3 feet; depth of water ½ feet; grade 5.28 feet per mile.

[At] width on top (at water-line) feet; width on bottom feet; depth of water feet; grade feet per mile.

8. Describe the character of proposed work, stating: 1st. The nature of material to be moved. 2nd. Number and length of tunnels, if any. 3rd. Amount of fluming, if any.

1st.- Earth 2nd- None 3rd. Flume across Little Box Elder Cr. 30 ft.

9. The estimated cost of said enlargement is Fifty Dollars.

10. The land to be irrigated has a total area of Fourteen & One-half (14½) acres, described as follows: (Give estimated acreage in fractions of subdivisions)

6 acres in SW¼SE¼ of Sec. 35 T. 33, R. 74
2 acres in SW¼NW¼ of Sec. 2)
2 acres in Lot 1) T. 32 R. 74
½ acre in SE¼NE¼) of Sec. 3,
4 acres in NW¼SE¼)

* *If the proposed work is to be an extension of the original ditch, give the location of the head of the extension by courses and distances from the nearest Government corner.*

A.M. Sec 3- T. 32 R. 74

Appropriate the Water of the State of Wyoming

11. Construction of the proposed enlargement or extension will begin within one year from date of approval of this application.

12. The time required for the completion of enlargement or extension is one year from Dec. 31, 1910., 19....

13. The time required to complete the application of water to the beneficial use stated in this application is two year from Dec. 31, 1910., 19....

14. A map in duplicate, prepared in accordance with the provisions of Section 35 of the Water Laws, accompanies this application.

Signed: H. K. Burket

NOTE.—*The statements in the foregoing application must comply with the requirements of Chapter 14, R. S. 1899.*

NOTE.—*Before application for the enlargement of ditches can be approved, the written consent of the owners of such ditches must be secured, and this must accompany the application.*

THE STATE OF ~~WYOMING,~~ Nebraska. }
COUNTY OF Lancaster } ss.

I hereby certify that the foregoing application was signed in my presence and sworn to before me by H. K. Burket this Eighteenth day of April, 1910

L. M. Bowen
Notary Public.

Seal.

Commission expires Mar. 17, 1913.

Notice of completion received SEP 20 1911

For assignment of 6 acres SW¼ SE¼ sec. 35, T. 33 N. R. 74 W. to Frank F. Brownfield, See Book 4, Misc. Records, page 88.

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE. } ss.

This is to certify that I have examined the foregoing application and have returned the same without my approval for the following reasons:

Witness my hand this ..... day of ....., A. D. 19.....

State Engineer.

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE. } ss.

This is to certify that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions: Box Elder Cr. & tribs.

The records of the State Engineer's Office show the waters of ~~to be largely appropriated. The appropriator under the permit is hereby notified of this fact and the issuance of this permit grants only the right to divert and use the surplus or waste water of the stream and confers no rights which will interfere with or impair the use of water by prior appropriators.~~

Work will begin within one year from date of approval.

The time for completing construction shall terminate on December 31, 1911

The time for completing the appropriation of water for beneficial use shall terminate on December 31, 1912

The amount of the appropriation shall be limited to one cubic foot per second of time for each seventy acres of land reclaimed on or before December 31, 1912, and the additional volume applied to Stock purposes on or before said date.

Witness my hand this 12th day of December, A. D. 1910

Clarence T. Johnston
State Engineer.

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE. } ss.

This instrument was received and filed for record on the 20th day of April, A. D. 1910, at 9 o'clock A. M., and duly recorded in Book 9 of Enlargements on Page 148

Clarence T. Johnston
State Engineer.

Enlargement of Little Box Elder Ditch Co. No. 4 Ditch as Changed to Douglas Pipeline

Permit 2335.0E
Certificates of Appropriation

12,063

THE STATE OF WYOMING

CERTIFICATE OF APPROPRIATION OF WATER

CERTIFICATE RECORD NO. 34 PAGE 254

WHEREAS, F. F. Brownfield has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Box Elder Spring tributary of Little Box Elder Creek through the Enlargement Little Box Elder No. 4 Ditch under Permit No. 2335 Enl. for irrigation of the lands herein described, lying and being in Converse County, Wyoming, and for stock purposes,

NOW KNOW YE, That the Board of Control, under the provisions of Division 1, Title 9, Chapters 10 and 14 of the Revised Statutes of Wyoming, 1899, has, by an order duly made and entered on the 23rd day of November, A. D. 1912, in Order Record No. 4 Page 634, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator F. F. Brownfield; Postoffice Address Douglas, Wyoming; Amount of Appropriation 0.08 cu. ft. per sec.; Date of Appropriation April 20, 1910; Description of land to be irrigated and for which this appropriation is determined and established; Total Acreage Six (6) acres.

6 A. SW¼ SE¼ Sec. 35, Tp. 33 N. R. 74 W.

For change of this right to preferred use for municipal purposes, See O.R. 6 P. 354.

The right to water hereby confirmed and established is limited to irrigation and stock purposes and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot per second for each seventy acres of land for which appropriation is herein determined and established.

IN TESTIMONY WHEREOF, I, A. J. Parshall, President of the State Board of Control, have hereunto set my hand this 31st day of January, A. D. 1913, and caused the seal of said Board to be hereunto affixed.

ATTEST: LOUISE JABELMANN, *Secretary.* A. J. Parshall, *President.*

12,064

THE STATE OF WYOMING

CERTIFICATE OF APPROPRIATION OF WATER

CERTIFICATE RECORD NO. 34 PAGE 255

WHEREAS, Green Valley Land & Live Stock Company has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Box Elder Spring tributary of Little Box Elder Creek through the Enlargement Little Box Elder No. 4 Ditch under Permit No. 2335 Enl. for irrigation of the lands herein described, lying and being in Converse County, Wyoming, and for stock purposes.

NOW KNOW YE, That the Board of Control, under the provisions of Division 1, Title 9, Chapters 10 and 14 of the Revised Statutes of Wyoming, 1899, has, by an order duly made and entered on the 23rd day of November, A. D. 1912, in Order Record No. 4 Page 634, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator Green Valley Land & Live Stock Company; Postoffice Address Douglas, Wyoming; Amount of Appropriation 0.12 cu. ft. per. sec.; Date of Appropriation April 20, 1910; Description of land to be irrigated and for which this appropriation is determined and established; Total Acreage Eight and five tenths (8.5) acres.

2.0 A.	SW¼	NW¼	Sec. 2,	Tp. 32 N. R. 74 W.
2.0 A.	Lot 1,		Sec. 3,	Tp. 32 N. R. 74 W.
0.5 A.	SE¼	NE¼	Sec. 3,	Tp. 32 N. R. 74 W.
4.0 A.	NW¼	SE¼	Sec. 3,	Tp. 32 N. R. 74 W.
8.5 A.	Total acreage.			

For change of this right to preferred use for municipal purposes, See O. R. 6 P. 354.

The right to water hereby confirmed and established is limited to irrigation and stock purposes, and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot per second for each seventy acres of land for which appropriation is herein determined and established.

IN TESTIMONY WHEREOF, I, A. J. Parshall, President of the State Board of Control, have hereunto set my hand this 31st day of January, A. D. 1913, and caused the seal of said Board to be hereunto affixed.

ATTEST: LOUISE JABELMANN., *Secretary.* A. J. Parshall, *President.*

Order OR 06/354-355
Change of Use Order Affecting Above Permits

Order changes use of permits from irrigation to municipal with no loss of Appropriation

Minute Record Book 5 Page 440

IN THE MATTER OF THE PETITION OF THE TOWN COUNCIL OF THE TOWN OF DOUGLAS, WYOMING, FOR CHANGE OF CERTAIN APPROPRIATIONS OF WATER FOR IRRIGATION PURPOSES FROM LITTLE BOX ELDER CREEK AND BOX ELDER SPRING TO PREFERRED USE FOR MUNICIPAL PURPOSES FOR AND WITHIN THE TOWN OF DOUGLAS, WYOMING, AND FOR CHANGE IN POINT OF DIVERSION FOR SAID APPROPRIATIONS TO THE POINT OF DIVERSION OF THE DOUGLAS PIPE LINE.

IN WATER DIVISION NO. I

FINDINGS AND ORDER

This matter coming regularly before the Board of Control this 12th day of April, 1924, the Board FINDS;

That the petitioner sets forth under oath that the Town of Douglas, Wyoming, is a municipal corporation existing under and by virtue of the laws of the State of Wyoming;

That by reason of the pollution of the present supply of water for said Town as received from the North Platte River, it is necessary for said Town to secure water for municipal purposes from other sources;

That in order to secure a sufficient and suitable supply of water for municipal purposes, the petitioner has acquired by deed or by contract the following appropriations of water from Box Elder Spring and from Little Box Elder Creek;

An appropriation of 1.10 cubic feet of water per second of time, from Little Box Elder Creek, priority 1879, E. S. No. 1 Ditch, Certificate Record No. 1, Page 298;

An appropriation of 0.36 cubic feet of water per second of time, from Little Box Elder Creek, priority 1879, E. S. No. 2 Ditch, Certificate Record No. 1, Page 298;

An appropriation of 1.60 cubic feet of water per second of time, from Little Box Elder Creek, priority May 20, 1885, Carey Little Box Elder No. 1 Ditch, Certificate Record No. 1, Page 299;

An appropriation of 0.87 cubic feet of water per second of time, from Box Elder Spring, tributary of Little Box Elder Creek, priority Spring 1885, Little Box Elder No. 4 Ditch, Certificate Record No. 32, Page 102;

An appropriation of 0.08 cubic feet of water per second of time, from Box Elder Spring, tributary of Little Box Elder Creek, priority April 20, 1910, Enl. Little Box Elder No. 4 Ditch, (Permit No. 2335 Enl.), Certificate Record No. 34, Page 254;

An appropriation of 0.12 cubic feet of water per second of time, from Box Elder Spring, tributary of Little Box Elder Creek, priority April 20, 1910, Enl. Little Box Elder No. 4 Ditch (Permit No. 2335 Enl.), Certificate Record 34, Page 255;

That the aforesaid appropriations amount to a total of 4.13 cubic feet of water per second of time, and that ample carrying capacity for this amount is being provided by the construction of a 14 inch diameter wood stave pipe line from the said sources of supply to the Town of Douglas;

That the present points of diversion for the above named appropriations are as follows:

E. S. No. 1 Ditch, N. 80° W. 1625' distant from the east quarter corner of Sec. 36, T. 33 N. R. 74 W.;

E. S. No. 2 Ditch, S. 74° 12' W. 460' distant from the northeast corner of Sec. 36, T. 33 N. R. 74 W.;

Carey Little Box Elder No. 1 Ditch, S. 73° 45' E. 2065' distant from the northwest corner of Sec. 25, T. 33 N. R. 74 W.;

Little Box Elder No. 4 Ditch, S. 81° E. 2944' distant from the west quarter corner of Sec. 3, T. 32 N. R. 74 W.;

That, in order to make the construction and use of the system of water supply as proposed the most practical and economical, it is necessary that the points of diversion for the several appropriations above described be changed to the location of the intake of the Douglas Pipe Line at Box Elder Spring, the new point of diversion being located at a point N. 15° 10' E. 1030 feet distant from the south quarter corner of Sec. 3, T. 32 N. R. 74 W.;

That wherever available, the Certificates of Appropriation named above have been presented with the petition.

The Board further FINDS;

That the petitioner has presented with the petition deeds conveying to The Town Council of the Town of Douglas, Wyoming, the aforesaid appropriations of water, with the exception of the appropriation through the Carey Little Box Elder No. 1 Ditch; that the owners of the latter right have entered into a contract with the petitioner, agreeing to convey said appropriation to the petitioner following the action of the Board of Control in the matter of the change to preferred use, and that a copy of the said contract is submitted with the petition;

That maps in duplicate, showing the location of the pipe line and of the several ditches involved, with the lands irrigated thereunder, have been filed in the office of the Board;

That this petition was considered by the Board at its meeting upon November 27th, 1923, and the matter then referred to the Superintendent of Water Division No. I for investigation and hearing;

That the several appropriators on the stream were duly notified of this hearing, by the publication of a legal notice in two of the newspapers of the County in which the rights involved are located, and by personal service upon said appropriators;

That the Superintendent of Water Division No. I has submitted his report, together with evidence of publication of said legal notice, and acceptance of service by the appropriators on the stream;

That the report of said Superintendent shows that no objections have been filed, and that no appearance was made by the interested parties at the time and place set for the hearing.

The Board, being advised by the showings in this case and by the records of the office, ORDERS;

That the petition be GRANTED;

That the above described appropriations amounting to 4.13 cubic feet of water per second of time acquired by The Town Council of the Town of Douglas, Wyoming, or unier contract of purchase by same, be and the same are hereby detached from the lands and purposes for which said appropriations were originally granted, and changed to a preferred use for municipal purposes for and within the Town of Douglas, Wyoming;

That the point of diversion of the several appropriations, which are by this Order changed to preferred use, be changed to the intake of the Douglas Pipe Line, located at a point which is N. 15° 10' E. 1030' distant from the south quarter corner of Sec. 3, T. 32 N. R. 74 W., and that the petitioner be henceforth permitted to divert the water for said appropriations at said point, and to convey and distribute the same through the Douglas Pipe Line for the use and purposes herein determined.

DONE AT CHEYENNE IN THE COUNTY OF LARAMIE THIS 12th DAY OF APRIL, 1924.

STATE BOARD OF CONTROL
By Frank L. Emerson
President.

Attest: Julia Bartlett Freeborn
Secretary.

Douglas Pipeline No. 1

Permit 16937.0D
Priority Date: 8/20/1923
Source: Little Box Elder Spring

234

Cert. Record 45 P 283 Ac. 3 8/8 cfs. 8.

PERMIT NO. 16937 B.3

NOTICE OF COMPLETION RECEIVED.....

PROOF SUBMITTED APR 1926

APPLICATION FOR A PERMIT TO DIVERT AND APPROPRIATE THE WATER OF THE STATE OF WYOMING

WATER DIVISION NO. 1. DISTRICT NO. 15

I, F. T. Cummings of Douglas

County of Converse, State of Wyoming, being duly sworn according to law, upon my oath say:

1. The name of the applicant is the Town of Douglas, Wyoming.

2. The postoffice address of the applicant is Douglas, Wyoming.

3. The use to which the water is to be applied is municipal and industrial purposes within the incorporate limits of the Town of Douglas

4. The name of the ~~ditch or canal~~ pipeline is Douglas Pipe Line No. 1.

5. The source of the proposed appropriation is Little Box Elder Spring, tributary of Little Box Elder creek which is a tributary of Box Elder Creek, trib. N. Platte River.

6. The headgate of the proposed ~~ditch or canal~~ pipeline is located N. 67° 15' W. 2700 feet distant from the S. E. corner of Section 3, T. 32 N., R. 74 W., and is in the S W 1/4 S E 1/4 of Section 3, T. 32 N., R. 74 W.

7. The said ~~ditch or canal~~ pipeline is to be 17.5 miles long.

8. The carrying capacity of the ~~ditch or canal~~ pipeline at the headgate is 3.8 cu. ft. per sec.

9. (a) The nature of the material to be moved is earth

(b) Number, length and size of tunnels None.

(c) Number, size and length of flumes None.

10. The estimated cost of said works is 250,000 Dollars.

11. Construction on proposed work will begin within one year from date of approval of this application.

12. The time required for the completion of the ditches and other distributing works is 3 years from December 31st, 1923

13. The time required to complete the application of water to the beneficial uses stated in this application is 4 years from December 31st, 1923.

14. The accompanying map is prepared in accordance with the Manual of Regulations and Instructions for Filing Applications in the State Engineer's Office and is hereby declared a part of this application.

15. The land to be irrigated is described in the following tabulation:

(Give Irrigable Acreage in Each 40-Acre Subdivision. Designate Ownership of Land, Government, State or Private. If Private, Give Names of Owners)

Township	Range	Sec.	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTALS
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	
				Supplemental supply to water rights secured by the Town of Douglas for preferred uses. See order of Board of Control dated April 12, 1924.														
				Use within corporate limits of Town of Douglas.														

TOTAL NUMBER OF ACRES TO BE IRRIGATED.....

(Signed) F. T. Cummings

A. W.

THE STATE OF WYOMING,
County of Laramie } ss.

I hereby certify that the foregoing application was signed in my presence and sworn to before me by F. T. Cummings this 20th day of August, 1923.

Seal.

Seymour L. Sharp,
Engineer, License No. 112.

Note: For details of location of pipeline to Town of Douglas and other information, all maps filed with petition in office of Board of Control for change of certain water rights to preferred uses as granted by the Board by order under date of April 12, 1924, and as of record in Order Record 6, Page 354.

NOTICE OF EXPIRATION OF TIME FOR COMMENCEMENT OF WORK MAILED. NOV 30 1925

SCANNED JUL 20 2016

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE, } ss.

THIS IS TO CERTIFY that I have examined the foregoing application, and have rejected same for following reasons:

Witness my hand this ..... day of ....., A. D. 19.....

State Engineer.

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE, } ss.

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions: Supplemental supply only. This permit grants only the right to use surplus water in the stream when all prior rights are satisfied.

Construction of proposed work shall begin within one year from the date of approval.

The time for completing the work shall terminate on December 31, 1926.

The time for completing the application of water to beneficial use shall terminate on December 31, 1927, and final proof of appropriation shall be made within five years thereafter.

The amount of the appropriation shall be limited to ~~one cubic foot per second of time for each seventy acres of land reclaimed on or before December 31, 19....., and~~ the ~~additional~~ volume used for the purposes specified in paragraph 3, on or before December 31, 1927, not to exceed 3.8 cubic feet per second. ~~purposes on or before said date.~~

Witness my hand this 13th day of March, A. D. 1925.

Frank C. Emerson
State Engineer.

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE, } ss.

This instrument was received and filed for record on the 20th day of August, A. D. 1923, at 2:30 o'clock P. M., and duly recorded in Book 54 of Applications, on page 234.

Frank C. Emerson
State Engineer.

Douglas Pipeline No. 1

Permit 16937.0D
Certificate of Appropriation

Limits total water out of the pipeline to 3.8 cfs

19246

THE STATE OF WYOMING

CERTIFICATE OF APPROPRIATION OF WATER

CERTIFICATE RECORD No. 45 PAGE 283

WHEREAS, Town of Douglas has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Little Box Elder Spring, Tributary Little Box Elder Creek, Tributary Box Elder Creek through the Douglas Pipe Line No. 1 ~~Ditch~~ under Permit No. 16937 for ~~irrigation~~ municipal & industrial purposes ~~of the lands herein described~~, lying and being in Converse County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of Chapters 65 and 68, Wyoming Compiled Statutes, 1920, has, by an order duly made and entered on the 20th day of April, A. D. 19 26, in Order Record No. 6, Page 671, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator Town of Douglas; Postoffice Address Douglas, Wyoming;

Date of Appropriation Aug. 20, 1923; Total Acreage ---;

Amount of Appropriation --- cu. ft. per sec.; Description of land to be irrigated and for which this appropriation is determined and established:

~~Twp.~~	~~Range~~	~~Sec.~~	NE¼				NW¼				SW¼				SE¼				~~Total~~
			~~NE¼~~	~~NW¼~~	~~SW¼~~	~~SE¼~~	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Previous appropriations established by proceeding changing rights to use of water for irrigation to preferred uses, as follows:

Terr. app. adjudicated in the name of Edward S. Johnson with priority of 1879, for 1.10 sec. ft.

Terr. app. adjudicated in the name of Edward S. Johnson with priority of 1879, for .36 sec. ft.

Terr. app. adjudicated in the name of J. M. & R. D. Carey with priority of May 20, 1885, for 1.60 sec. ft.

Terr. app. adjudicated in the name of F. G. McCrossin with priority of Spring 1885, for .87 sec. ft.

Per. No. 2335 Enl. adjudicated in the name of Green Valley L. & L. S. Co. with priority of Apr. 20, 1910, for .12 sec. ft.

Per. No. 2335 Enl. adjudicated in the name of F. F. Brownfield with priority of Apr. 20, 1910, for .08 sec. ft.

Supplemental supply only. The total amount of water that may be used under the combined appropriations shall not exceed 3.8 cu. ft. per second for the purposes herein set forth.

The right to water hereby confirmed and established is limited to ~~irrigation~~ municipal and industrial purposes and the use is restricted to the place where acquired and to the purpose for which acquired; ~~rights for irrigation not to exceed one cubic foot of water per second for each seventy acres of land for which the appropriation is herein determined and established.~~

IN TESTIMONY WHEREOF, I Frank C. Emerson, President of the State Board of Control, have hereunto set my hand this 3rd day of July, A. D. 19 26, and caused the seal of said Board to be hereunto affixed.

ATTEST: Julia Bartlett Freeburn, *Secretary.* Frank C. Emerson, *President.*

First Enlargement of Douglas Pipeline No. 1

Permit 7179.0E
Priority Date: 1/17/1996
Source: Little Box Elder Spring

13506

Form S.W. 2
Rev. 11-87
ML. Nelson

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

MICRO FILMED SEP 12 1997

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING, STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the 17th day of January, A.D. 19 96, at 9:00 o'clock A. M.

John R. Barnes
JOHN R. BARNES, for State Engineer

Recorded in Book 31 of Enlargements, ___ on Page 65.

Fee Paid $ 50.00. Map Filed E.

WATER DIVISION NO. 1 DISTRICT NO. 15-5 Temp. Filing No. 29 6/79

PERMIT NO. 7179 ENLARGEMENT

E-26

NAME OF FACILITY TO BE ENLARGED

First ENLARGEMENT OF THE Douglas Pipe Line No. 1

1. Name(s), mailing address and phone no. of applicant(s) is/are City of Douglas
P. O. Box 1030, Douglas, Wyoming 82633

(If more than one applicant, designate one to act as Agent for the others)

2. Name & address of agent to receive correspondence and notices John A. Lambert, City Engineer
P. O. Box 34, Douglas, Wyoming 82633

3. (a) The use to which the water is to be applied is Municipal, Domestic

(b) If more than one beneficial use of water is applied for, the location and ownership of the point(s) of use must be shown in item 10 of the application and the details of the facilities used to divert and convey the appropriation must be shown on the map in sufficient detail to allow the State Engineer to establish the amount of appropriation. In multiple use applications, stock and domestic purposes are limited to 0.056 cubic feet per second.

4. The source of the proposed appropriation is Little Boxelder Spring trib. Little Boxelder Creek trib. Boxelder Creek trib. North Platte River

5. (a) The headgate of the facility to be enlarged is located N 67o 15' W 2700 feet distant from the SE corner of Section 3 T. 32 N., R. 74 W., and is in the SW¼SE¼ of Section 3 T. 32 N., R. 74 W.

(b) Said facility has a carrying capacity at the headgate of 2.47 cubic feet per second.

(c) Permitted uses under said facility are described in Permit Nos. 16937

6. If the enlarged or extended portion of the proposed facility is located on lands owned by the State or Federal Government, describe lands and indicate whether State or Federally owned. Pipeline crosses Sec. 36,T.33N., R.74W. State Land

7. If the proposed application will require a physical enlargement or extension of the facility being enlarged, complete the following:

(a) The head of the extension is located N/A feet distant from the --- corner of Section --- T. --- N., R. --- W., and is in the --- of Section --- T. --- N., R. --- W.

(b) The said facility as physically enlarged will have a carrying capacity at the headgate of 2.47 cubic feet per second.

8. The estimated time required for the commencement of work is Existing, for completion of construction is Existing Existing, and to complete the application of water to the beneficial uses stated in this application is --- ---.

Permit No. 7179 Enl. Page No. 65 (Leave Blank)

9. The accompanying map is prepared in accordance with the State Engineer's Manual of Regulations and Instructions for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

10. The land to be irrigated under this permit is described in the following tabulation: (Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
				Areas of Use Within the Douglas City Limits and															
				Adjoining Areas, Along the Douglas Pipe Line No. 1															
				and Along The Sheep Mountain Well Pipeline															
DEP. RES. 32N	71W	4							L8	L4		L9	L6	L5					
"	"	5											L4	L3			L2		
"	"	6													L11			L1	
"	"	7	All																
"	"	8	All																
"	"	9					x	x	x	x	x	x	x	x	x	x	x	x	
" O.S.	"	10											x						
"	"	14											x						
"	"	15					x	x	x	x	x	x	x	x	x	x	x	x	
"	"	16	All																
"	"	17	All																
" DEP. RES.	"	18	All																
"	"	19	x	x	x	x	L5	L6	L7	L8									
" O.S.	"	20						x	x										

Number of acres to receive original supply _____

Number of acres to receive supplemental supply _____

Total Acreage Under This Enlargement _____

REMARKS

The City of Douglas uses water from the Little Boxelder Spring through the Douglas Pipe Line No, 1, from the Sheep Mountain Well and from Water Treatment Plant on North Platte River. The areas of use shown are for the City and adjacent areas as well as areas along both pipeline routes. Areas have been added adjacent to the CityLimits which have or will have service from the City.

CONSENT TO ENLARGE

The City of Douglas, Wyoming is

the sole owner of the Douglas Pipe Line No. 1 Ditch,

taking water from Little Boxelder Spring under Permit No. 16937,

for and in consideration of _____

do hereby give _____ free and voluntary consent to the enlargement or extension of, and to the use of water through the said ditch, for the irrigation of _____ acres, by _____, according to the terms of his application for enlargement.

Dated _____, 19 ____.

No Consent Necessary

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

John A. Lambert - Agent for City of Douglas
Signature of Applicant or Agent

January 15, 1996
Date

MICRO FILMED SEP 12 1997

T.F.No. 29 6/79

10. The land to be irrigated under this permit is described in the following tabulation. (Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
32N	71W	21	x	x			x												
"	"	22	x	x			x	x											
"	"	23						x											
32N	72W	1									L15	L16	L4	L3		L14	L2		
"	"	2			L13		~~L9~~	L8	L11	L12	L17			~~L3~~	L15	L16	L21	~~L1~~	
"	"	3	~~L5~~	~~L6~~		L12	L7	L8											
"	"	12	x	x		x	x								x		x	x	
"	"	13	All																
"	"	24	x	x	x	x	x			x	x		x	x	x	x			
"	"	25					x	x	x										
"	"	26			x	x					x		x	x	x	x	x		
"	"	27																x	
"	"	34	x		x	x			x	x	x	x			x	x			
"	"	35						x	x										
33N	72W	29							x		x	x				x	x	x	
"	"	30			x	x	x	x	x	x					x	x			
"	"	32	x																
"	"	33		x	x	x	x	x		x					x				
"	"	34							x	x	x	x		x		x	x	x	
"	"	35											x	x					
33N	73W	25	x	x	x	x	x	x	x	x									
"	"	26	x	~~L9~~	~~L10~~	x	~~L1~~	~~L2~~	~~L3~~	~~L4~~									
"	"	27	x	x	x	x	x	x	x	x									
"	"	28	x	x	x	x	x	x	x	x									
"	"	29			x	x			x	x	x	x	x		x	x			
"	"	30												x	x	x	x	x	
"	"	31		x			x	x	x	x		x							
33N	74W	36				x							x	x	x	x	x	x	
IND. RES 32N	74W	~~2~~		~~x~~			~~x~~	~~x~~	~~x~~										
"	"	~~3~~	~~x~~		~~x~~	~~x~~									~~x~~	~~x~~			
		TR	52																
		TR	38																
		TR	40																
		~~TR~~	~~41~~																
		TR	39																

FOV 10/19/99

THE STATE OF WYOMING } SS.
STATE ENGINEER'S OFFICE }

TEMPORARY FILING NO. 29 6/79

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

This permit is granted for the expansion of the Municipal use service area only. No new appropriation is granted under this permit.

~~The time for completing the construction work shall terminate on December 31, 19____.~~

~~The time for completing the application of water to beneficial use shall terminate on December 31, 19_____, and final proof of appropriation shall be made within 5 years thereafter.~~

Witness my hand this 13th day of April, A.D. 1997.

Gordon W. Fassett
GORDON W. FASSETT State Engineer

Permit No. 7179 Enl.

Page No. 65
(Leave Blank)

PERMIT NO. 7179 ENL.

E-26

PERMIT STATUS

Priority Date January 17, 1996 Approval Date April 13, 1997

PROOF PREPARED, ADJUDICATION IN PROCESS

MICRO FILMED SEP 12 1997 MICRO FILMED AUG 12 1999

CERT. REC. 82, P. 35 PROOF NO. 37848

IRR. ___ STK. ___ DOM. X MISC. X mun

AC. NONE C.F.S. NONE

MICRO FILMED JUL 10 2000

SCANNED JUN 02 2015

NOTICE

This permit, does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within the time allowed in the permit.

Notice of completion of the work described in the permit, must be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

Once the Notice of Completion has been filed, Proof of Appropriation will be prepared and sent to your Water Division Superintendent. The Superintendent will arrange with you for an inspection of the facility. Should you desire adjudication, the Proof will be considered by the Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Construction which will constitute a completed water right.

The granting of a permit does not constitute the granting of right-of-way. If any right-of-way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

First Enlargement of Douglas Pipeline No. 1

Permit 7179.0E
Certificate of Appropriation

Service Area Enlargement, no additional water Adjudicated

THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 37848
Certificate Record No. 82 Page 35
Water Division No. 1 , District No. 15-5

WHEREAS, City of Douglas has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Little Box Elder Spring, tributary Little Box Elder Creek, tributary Box Elder Creek, tributary North Platte River through the Douglas Pipe Line No. 1 under Permit No. 7179 E ; ----------municipal and domestic purposes herein described, lying and being in Converse County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made on September 2, 1999 and entered on October 29, 1999 , in Order Record 52 Page ~~159~~ 156 , determined and established the priority and amount of such appropriation as follows:

Name and Address of Appropriator(s) City of Douglas, P.O. Box 1030, Douglas, WY 82633

; Date of Appropriation (Priority) January 17, 1996 ; Amount of Appropriation ----------NONE---------- cu. ft. per sec.;

Total Acreage ----------NONE---------- ; Head Gate SW¼SE¼, Section 3-32-74

DESCRIPTION OF LAND FOR WHICH THIS APPROPRIATION IS DETERMINED AND ESTABLISHED

TWP	RANGE	SEC	NE ¼				NW ¼				SW ¼				SE ¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
							(SEE ATTACHED TABULATION SHEET)												

The right to water hereby confirmed and established is limited to municipal and domestic purposes---------- and the use is restricted to the place where acquired and to the purpose for which acquired.

IN TESTIMONY WHEREOF, I, GORDON W. FASSETT President of the State Board of Control, have hereunto set my hand this 29th day of October , A.D. 1999 , and caused the seal of said Board to be hereunto affixed.

Attest: Allan Cunningham Ex-officio Secretary

Gordon W. Fassett President.

TABULATION OF ADJUDICATED LANDS

Certificate Record No. 82 , Page 35
Order Record No. 52 , Page ~~159~~ 156
Permit No. 7179 E , Proof No. 37848

V

COPY

TWP	RANGE	SEC	NE ¼				NW ¼				SW ¼				SE ¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			This appropriation is granted for the expansion of the municipal use service area at the following described points of use:																
Resurvey 32N	71W	4	Lot 4;	Lot 5,	Lot 6;	Lot 8;	Lot 9												
		5	Lot 2;	Lot 3;	Lot 4														
		6	Lot 1;	Lot 11															
		7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		9					X	X	X	X	X	X	X	X	X	X	X	X	
		10											X						
		14											X						
		15					X	X	X	X	X	X	X	X	X	X	X	X	
		16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		19	X	X	X	X													
		19	Lot 5;	Lot 6;	Lot 7;	Lot 8													
		20						X	X										
		21	X	X			X												
		22	X	X			X	X											
		23						X											
Resurvey 32N	72W	1	Lot 2;	Lot 3;	Lot 4;	Lot 12;	Lot 14;	Lot 15;	Lot 16										
		2	Lot 8;	Lot 10;	Lot 11;	Lot 12;	Lot 13;	Lot 15;	Lot 16;	Lot 17;	Lot 20;	Lot 21,	Lot 22						
		3	Lot 7;	Lot 8;	Lot 9;	Lot 10;	Lot 11;	Lot 12											
		12	X	X		X	X								X		X	X	
		13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
										(CONTINUED)									

TABULATION OF ADJUDICATED LANDS

Certificate Record No. 82 , Page 35
Order Record No. 52 , Page ~~159~~ 156
Permit No. 7179 E , Proof No. 37848

V

COPY

TWP	RANGE	SEC	NE ¼				NW ¼				SW ¼				SE ¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
Resurvey 32N	72W	24	X	X	X	X	X			X	X		X	X	X	X			
		25					X	X	X										
		26			X	X					X		X	X	X	X	X		
		27																X	
		34	X		X	X			X	X	X	X			X	X			
		35						X	X										
Resurvey 32N	74W	--	Tract 38; Tract 39; Tract 40; Tract 52																
33N	72W	29							X		X	X				X	X	X	
		30			X	X	X	X	X	X					X	X			
		32	X																
		33		X	X	X	X	X		X					X				
		34							X	X	X	X		X		X	X	X	
		35											X	X					
Resurvey 33N	73W	25	X	X	X	X	X	X	X	X									
		26	X			X													
		26	Lot 1; Lot 2; Lot 3; Lot 4; Lot 9; Lot 10																
		27	X	X	X	X	X	X	X	X									
		28	X	X	X	X	X	X	X	X									
		29			X	X			X	X	X	X	X		X	X			
		30												X	X	X	X	X	
		31		X			X	X	X	X		X							
Resurvey 33N	74W	36				X							X	X	X	X	X	X	

Sheet 03 of 03

Little Box Elder Water Haul (Temporary)

Permit 36880.0D
Expired 5/2/2025
Source: Little Box Elder Spring

Form S.W. 1
Rev.07/14/2021

Ck #90556
$50.00

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

RCVD 4-14-2023 10:00 AM

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

J. McNulty

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the 14th day of April, 20 23, at 10:00 o'clock A. M.

For State Engineer

Recorded in Book _____ of Ditch Permits, on Page _____

Fee Paid $ 50.00 Map Filed _____

WATER DIVISION NO. 1 DISTRICT NO. 15-5 COUNTY(IES) Converse

TEMPORARY FILING NO. 37 5/385D PERMIT NO. 36880

NAME OF FACILITY Little Box Elder Water Haul

1. Name(s), mailing address and phone no. of applicant(s) is/are City of Douglas, PO Box 1030 Douglas WY, 82633 (307) 358-3462

E-mail address: joberlander@cityofdouglas.org
(if more than one applicant, designate one to act as Agent for the others)

2. Name & address of agent to receive correspondence and notices Joshua M. Oberlander, City of Douglas PO Box 1030 Douglas, WY 82633

E-mail address: joberlander@cityofdouglas.org

3. (a) The use to which the water is to be applied is Temporary-Industrial Use (Oil & Gas Development) J.M.

(b) If more than one beneficial use of water is applied for, the location and ownership of the point of use must be shown in item 10 of the application and the details of the facilities used to divert and convey the appropriation must be shown on the map in sufficient detail to allow the State Engineer to establish the amount of appropriation. In multiple use applications, stock and domestic purposes are limited to 0.056 cubic feet per second.

4. The source of the proposed appropriation is Little Box Elder Spring, tributary of Little Box Elder Creek, tributary of Box Elder Creek, tributary of North Platte River, tributary of Platte River, tributary of Missouri River

5. The point of diversion of the proposed works is located _____ feet distant from the _____ corner of Section _____ T. _____ N., R. _____ W., and is in the Tract 44 of ~~Section~~ 0 T. 032N N., R. 074W W.
Lot _____ Block _____ Subdivision Name _____ Indep. Resurvey
Latitude 42.76749 Longitude -105.70537

6. Are any of the lands crossed by the proposed facility owned by the State or Federal government? If so, describe lands and indicate whether State or Federally owned.

N/A

7. The carrying capacity of the ditch, canal, pipeline or other facility at the point of diversion is 1.11 cubic feet per second (c.f.s.)

8. The accompanying map is prepared in accordance with the State Engineer's Rules and Regulations for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

9. The estimated time required for the completion of construction is two years, and to complete the application of water to the beneficial uses stated in this application is two years.

Permit No. 36880

Page No. _____ (Leave Blank)

10. The land to be irrigated under this permit is described in the following tabulation. (Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

Town-	Range	Sec.	NE¼				NW¼				SW¼				SE¼				
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
Resurvey			A	r	e	a		o	f		u	s	e		i	s			
			e	n	t	i	r	e	t	y		o	f						
			c	o	n	v	e	r	s	e		c	o	u	n	t	y	,	
			s	e	e		p	e	r	m	i	t		m	a	p			
			The amount of appropriation shall be limited to the amount of water used for temporary (industrial) purposes only, not to exceed the diversion rate from Little Box Elder Spring of 1.11 CFS (500 GPM), or 720,000 gallons per day, or a total of 52,520,000 gallons during the twenty-four (24) month period.																

Number of acres to receive original supply	0.00
Number of acres to receive supplemental supply	0.00
Total number of acres to be irrigated	0.00

REMARKS

The City of Douglas is requesting a permit for water haul activities across Converse County for industrial purposes using water from Little Box Elder Spring. The point of diversion is an existing 3-inch load out facility located at the Public Works shop. The maximum instantanious rate is 1.11 CFS (500 GPM), the annual maximum is 26,260,000 gallons or 52,520,000 gallons in the two years from ~~any one or all three sources.~~ Little Box Elder Spring J.M.

Water will be used for Industrial Purposes: Energy Development - Drilling, Stimulation, and Incidental Well Site Construction

I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

By providing an email address you agree to receive communications and notices electronically

J.D. Cox, City Administrator
Printed Name and Signature of Applicant or Agent

11 April 2023
Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } **ss.**

TEMPORARY FILING NO. 37 5/385D

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

This permit is issued with the condition that the permittee shall notify the District Water Commissioner prior to diverting water.

This permit is conditioned on the holder of this permit securing and/or providing free and unencumbered access to this facility site to allow State Engineer personnel to perform their duties as prescribed by Law. These duties include, but are not limited to, construction inspections and water administration.

This permit will be automatically cancelled on 05/04/2025.

No final proof of appropriation to be accepted under this permit.

The notices of completion and of beneficial use are waived and will not be required because of the temporary nature of this appropriation.

Platte River Recovery Implementation Program.

This permit is issued subject to all limitations imposed by the Platte River Recovery Implementation Program (PRRIP) of January 1, 2007. This permit was reviewed by the PRRIP Coordinator. It is determined that the depletions associated with the water hauling are covered by the State of Wyoming due to the temporary status of this activity. No mitigation is currently necessary. However, if this facility is found to have depletive effects in accordance with Wyoming's Depletions Plan, the permit holder may be required to mitigate depletions from this activity at a future date.

The permit holder shall install a suitable measuring device at the point of diversion. The measuring device must be preapproved by the State Engineer or his designee. The permit holder shall keep daily records of all water diverted under this permit. On forms provided by the State Engineer's Office, during the term of this permit the permit holder shall submit the total amount of water diverted under the permit during the previous month by regular or electronic mail to the State Engineer's Office, Herschler Building, 2W, Cheyenne, WY 82002, Phone: 307-777-6475, Email: sandra.lorentz@wyo.gov no later than the 10th day of each month, whether water is diverted or not. The permit holder's failure to submit records as required may result in denial of use of water under this permit. The State Engineer's Office may use the records as necessary for water administration, water accounting purposes, and/or to determine depletive effects.

~~The time for completing the construction work shall terminate on December 31, 20_____.~~

~~The time for completing the application of water to beneficial use shall terminate on December 31, 20_____, and final proof of appropriation shall be made within 5 years thereafter.~~

Witness my hand this 4th day of May, A.D. 2023.

For: BRANDON GEBHART, P.E., State Engineer

Permit No. 36880

Page No. _____
(Leave Blank)

PERMIT NO. 36880

PERMIT STATUS

Priority Date April 14, 2023 Approval Date May 4, 2023

NOTICE

This permit, does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within the time allowed in the permit.

Notice of completion of the work described in the permit, must be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

Once the Notice of Completion has been filed, Proof of Appropriation will be prepared and sent to your Water Division Superintendent. The Superintendent will arrange with you for an inspection of the facility. Should you desire adjudication, the Proof will be considered by the Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Construction which will constitute a completed water right.

The granting of a permit does not constitute the granting of right-of-way. If any right-of-way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

Sheep Mountain Well No. 1

Permit UW 97415.0
Priority Date: 4/17/1990
Source: Sheep Mountain Well No.1

SUBSTITU[illegible]PLICATION 5/19 1994 10 am

FORM U.W. 5
Rev. 3-94
FILING FEE SCHEDULE
ON REVERSE SIDE

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER
HERSCHLER BLDG., 4-E CHEYENNE, WYOMING 82002

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

KAT MICRO FILMED JAN 30 1995

APPLICATION FOR WELLS AND SPRINGS

Note: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic and/or stock watering, will be considered as ground water appropriations.

FOR OFFICE USE ONLY

PERMIT NO. U.W. 97415
WATER DIVISION NO. 1 DISTRICT 15-5
U.W. DISTRICT Converse Co.

Temporary Filing No. U.W. 21-7-62

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE

NAME AND NUMBER OF WELL or SPRING Sheep Mountain Well No. 1

1. Name of applicant(s) City of Douglas, Wyoming Phone:

2. Address of applicant(s) P.O. Box 1030, (STREET) Douglas (CITY) WY (STATE) 82633 (ZIP)

3. Name & address of agent to receive correspondence and notices Civil Engineering Professionals, Inc.

355 North Lincoln Street (STREET) Casper (CITY) WY (STATE) 82601 (ZIP) Phone: 266-4346

4. Use to which the water will be applied:

☐ **Domestic:** Use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totalling one acre or less. Number of houses served? _____.

☐ **Stock Watering:** Normal livestock use at four tanks or less within one mile of well or spring. Stockwatering pipelines and commercial feedlots are a miscellaneous use.

☐ **Irrigation:** Watering of commercially grown crops, (large-scale lawn watering of golf courses, cemeteries, recreation areas, etc., is miscellaneous use.)

☒ **Municipal:** Use of water in incorporated Towns and Cities, (use of water in unincorporated towns, subdivisions, improvement districts, mobile home parks, etc. are classified as miscellaneous use.)

☐ **Industrial:** Long term use of water for the manufacture of a product or production of oil/gas or other minerals, (oil field water flood operations, power plant water supply, etc). (Describe in REMARKS)

out ☒ **Miscellaneous:** Any use of water not defined under previous definitions such as stockwater pipelines, subdivisions, mine dewatering, mineral / oil exploration drilling, reclamation purposes, potable and sanitary supplies in offices or light manufacturing, animal waste management, etc. Describe miscellaneous use completely: Municipal use-Town of Douglas; Rural Water System-Ridgewater Estates; and adjacent housing developments

☐ **Monitor, Observation or Test Well: (Describe in REMARKS)**

5. Location of the well or spring: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: SE 1/4 NW 1/4 of Sec. 12, Township 14 North, Range 68 West.)
Converse County, NE 1/4 SE 1/4 of Sec. 33, T. 32 N., R. 72 W. of the 6th P.M. (or W.R.M.), Wyoming. If located in a platted subdivision, also provide Lot _____, Block _____ of the _____ Subdivision (or Add'n) of _____. Resurvey Location: Tract _____, (or Lot) _____.

6. Estimated depth of the well or spring is 1165 feet.

7. (a) MAXIMUM instantaneous flow of water to be developed and beneficially used: ~~1500~~ 1200 Adj. Amt. gallons per minute. NOTE: If for domestic and / or stock use, this application will be processed for a maximum of 25 gallons per minute. For a spring, after approval of this application, some type of artificial diversion or improvement must be constructed to qualify for a water right.

✓ (b) MAXIMUM volumetric quantity of water to be developed and beneficially used per calendar year: 1939.5 AF/yr. 632,000,000
Circle appropriate units: (Gallons) (Acre Feet) A four person family utilizes approximately one (1) acre-foot of water per year or 325,000 gallons.

8. If use is not irrigation, mark the point(s) or area(s) of use in the tabulation box below.

9. If for irrigation use:
a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation box below.
b. ☐ Land will be irrigated from this well only.
c. ☐ Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.

TABULATION BOX

TWP	RNG	SEC	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTAL
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	
					see attached tabulation sheet														

10. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc: _____

97415 SEE REVERSE SIDE

Permit No. U.W. _____ Book No. 753 Page No. 16

11. The well or spring is to be constructed on lands owned by Bedtick RAnches, Inc.
(The granting of a permit does not constitute the granting of right-of-way. If any easement or right-of-way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not the co-applicant.)

12. The water is to be used on lands owned by Residents of the City of Douglas, Ridgewater Estates No. 1 and No. 3., and other area residents.
(If the landowner is not the applicant, a copy of the agreement relating to the usage of appropriated water on the land should be submitted to this office. If the landowner is included as co-applicant on the application, this procedure need not be followed.) NOTE: Water rights attach to the area(s) and/or point(s) of use.

REMARKS: This well will supplement the water supply for the town of Douglas, and will supplement or replace the water supply for the Ridgewater Improvement District and other subdivisions. The area to be served outside of the City of Douglas shall be as shown by the attached Service Area Map. This well was drilled under cancelled permit U.W. 82387.

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

Bobbie Fitzhugh, City Administrator 5/17, 19 94
Signature of Applicant or Authorized Agent Date

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES (Domestic use is defined as use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totalling one acre or less.)	$25.00
IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS	$50.00
MONITOR (For water level measurements or chemical quality sampling, test well)	NO FEE

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING)
) ss.
STATE ENGINEER'S OFFICE)

The original of: This instrument was received and filed for record on the 17th day of April, A.D. 19 90, at 9:00 o'clock A. M. Substitute received: May 19, 1994

Permit No. U.W. 97415

for State Engineer

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.

Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.

If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use without loss of water into sub-surface formations or at the land surface.

FOR ADDITIONAL CONDITIONS AND LIMITATIONS SEE ATTACHED STATUS SHEET
NOTICE OF COMMENCEMENT WAIVED.

~~Approval of this application may be considered as authorization to proceed with construction of the proposed well or spring. Construction of well or spring will begin within one (1) year from date of approval~~. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of the beneficial use of water for the purposes specified in Item 4 of this application will be made by December 31, 19 95.

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water to beneficial use.

Witness my hand this 19th day of October, A.D. 19 94.

Gordon W. Fassett, State Engineer

The original of this application is filed in Miscellaneous Notices under Permit No. U.W. 97415.

KAI MICRO FILMED JAN 30 1995

ATTACHMENT SHEET FOR PERMIT NO. U.W. 97415, Sheep Mountain Well No.1

"Additional Conditions and Limitations"

This appropriation will allow the City of Douglas Municipal Water System to pump a total combined quantity of **380** acre-feet of ground water on an average annual basis and a combined total quantity of no more than **475** acre-feet of ground water in any one calendar year from its water well field. Such average annual pumping shall be computed on the basis of ten (10) consecutive years commencing with the calendar year **2013**. The City of Douglas Municipal Water System shall pump no more than **3,800** acre-feet of ground water in any ten (10) year period from its water well field provided however, that the State Engineer may, pursuant to application, permit the City of Douglas Municipal Water System to withdraw additional quantities of ground water.

Exception to the above ground water well field production cap on an annual basis will be allowed only during the rehabilitation or reconstruction of the works at Little Box Elder Spring. The rehabilitation or reconstruction will require that spring flow not be diverted to Douglas Pipe Line and during this rehabilitation time frame, an ability to exceed the ground water well field cap shall be allowed during the rehabilitation or reconstruction to provide water to users along said pipeline. Water from this well and Little Box Elder Well No.1, Permit No. U.W. 198039, will be used to offset the quantity of water historically diverted from Little Box Elder Spring. The 10 year volumetric cap shall not be exceeded even if the rehabilitation offset, allowing additional ground water to be pumped during this time frame, is exercised.

During the period of rehabilitation or reconstruction of Little Box Elder Spring, the quantity of water offset by Little Box Elder Well No. 1 shall be reported independently and qualified as offset water.

"Commingled Water Rights"

Water from the following sources are commingled and used to provide supply for municipal purposes within the City of Douglas Municipal Water System:

1.) Sheep Mountain Well No.1, Permit No. U.W. 97415 having priority date of April 17th, 1990.
2.) Little Box Elder Well No.1, Permit No. U.W 198039, having priority date of March 15th, 2012.
3.) E.S. #1 Ditch ,Territorial Proof 3331, having priority of 1879, as amended by Permit No. 16937, Douglas Pipe Line No. 1
4.) E.S. #2 Ditch, Territorial Proof 3332, having priority of 1879, as amended by Permit No. 16937, Douglas Pipe Line No. 1
5.) Carey Little Box Elder #1 Ditch, Territorial Proof 3334, having priority of 1885, as amended by Permit No. 16937, Douglas Pipe Line No. 1
6.) Little Box Elder #4 Ditch, Territorial Proof 3338, having priority of 1885, as amended by Permit No. 16937, Douglas Pipe Line No. 1
7.) Enl. Little Box Elder #4, Permit No. 2335 Enl., Proof No. 12063, having priority of April 20, 1910, as amended by Permit No. 16937, Douglas Pipe Line No. 1
8.) Enl. Little Box Elder #4, Permit No. 2335 Enl., Proof No. 12064, having priority of April 20, 1910, as amended by Permit No. 16937, Douglas Pipe Line No. 1
9.) Douglas Pipe Line, Permit No. 9903D, having priority of June 15, 1910
10.) Douglas Canal, Permit No. 6101D, Proof No. 25267, having priority of July 7, 1904. As changed to the Reno-Maurer Pump Ditch, thence to the Douglas Pipeline (see CR 73, page 365)

Tabulation of Area of Use for Permit No. U.W. 97415, Sheep Mountain No.1

TWN	RGE	SEC	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			Water from this well is used for municipal purposes within the following described area of use:																
32N	74W	2	R.S. Tracts 38 and 52																
32N	74W	3	R.S. Tracts 39 and 40																
33N	74W	36				X							X	X	X	X	X	X	
33N	73W	31		X			X	LOT 1	LOT 2	X		LOT 3							
33N	73W	30												X	X	X	X	X	
33N	73W	29			X	X			X	X	X	X	X		X	X			
33N	73W	28	X	X	X	X	X	X	X	X									
33N	73W	27	X	X	X	X	X	X	X	X									
33N	73W	26	X	LOT 9	LOT 10	X	LOT 1	LOT 2	LOT 3	LOT 4									

Tabulation of Area of Use for Permit No. U.W. 97415, Sheep Mountain No.1

TWN	RGE	SEC	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
33N	73W	25	X	X	X	X	X	X	X	X									
33N	72W	30			X	X	X	LOT 1	LOT 2	X					X	X			
33N	72W	29							X		X	X				X	X	X	
33N	72W	32	X																
33N	72W	33		X	X	X	X	X		X					X				
33N	72W	34							X	X	X	X		X		X	X	X	
33N	72W	35											X	X					
32N	72W	1				LOT 12					LOT 15	LOT 16	LOT 4	LOT 3		LOT 14	LOT 2		
32N	72W	2			LOT 13			LOT 8,10	LOT 11	LOT 12	LOT 17			LOT 20	LOT 15	LOT 16	LOT 21	LOT 22	
32N	72W	3	LOT 5,11	LOT 6,10		LOT 12	LOT 7,9	LOT 8											
32N	72W	12	X	X		X	X								X		X	X	
32N	72W	13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
32N	72W	24	X	X	X	X	X			X	X		X	X	X	X			
32N	72W	25					X	X	X			X							
32N	72W	26			X	X					X		X	X	X	X	X		
32N	72W	27																X	
32N	72W	33				X									X				
32N	72W	34	X		X	X			X	X	X	X			X	X			
32N	72W	35						X	X										
32N	71W	3							X			X							
32N	71W	4									Lot 5		X	Lot 5	X		X	X	
32N	71W	5											Lot 4	Lot 3				Lot 1	
32N	71W	6													Lot 11			Lot 1	
32N	71W	7	ALL																
32N	71W	8	ALL																
32N	71W	9					X	X	X	X	X	X	X	X	X	X	X	X	
32N	71W	10											X						
32N	71W	14											X						
32N	71W	15					X	X	X	X	X	X	X	X	X	X	X	X	
32N	71W	16	ALL																
32N	71W	17	ALL																
32N	71W	18	ALL																
32N	71W	19	X	X	X	X	Lot 5	Lot 6	Lot 7	Lot 8									
32N	71W	20				X		X	X						X			X	
32N	71W	21	X	X			X	X	X	X	X	X	X	X					
32N	71W	22	X	X			X	X											
32N	71W	23		X	X		X	X		X									

FORM UW: C&L,C1
Rev: 5-10-93

PERMIT NO. U.W. 97415
T.F. No. U.W. 21-7-62
PERMIT STATUS

KAI MICRO FILMED JAN 30 1995

Priority Date April 17, 1990 **Approval Date** October 19, 1994

ADDITIONAL CONDITIONS AND LIMITATIONS:

1. A meter acceptable to the State Engineer is required to accurately measure the total quantity of water produced from this well.

2. 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 each month during the previous January 1 to December 31, twelve (12) month period.

3. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.

4. The report shall contain at least two (2) semi-annual measurements of the static water level in the well as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time the well was "shut-in" prior to obtaining the measurements must be specified.

5. The State Engineer may, upon written request, waive all or any portion of these conditions and limitations.

October 19, 1994
DATE OF APPROVAL

Gordon W. Fassett
Gordon W. Fassett, State Engineer

KAI MICRO FILMED JAN 30 1995

December 23, 1994 - Statement of Completion on July 13, 1990 received.

December 23, 1994 - Proof of Beneficial Use on July 20, 1994 received.

KAI MICRO FILMED MAY 22 1995

TM2855-F held 11/11/95
Field inspected 7-30-99

July 2, 2013 - This permit has been enlarged by Permit No. U.W.200694 for additional use and area of use only.
There is no physical enlargement of this well.

SCANNED OCT - 9 2013

December 14, 2015 - This permit has been enlarged by Permit No. U.W.205009 for additional use and points of use only.
There is no physical enlargement of this well.

SCANNED JAN 14 2016

Cert. Rec. U.W. 22 Page 087
Proof No. U.W. 07259 Acres 0
G.P.M. 1200 Irr. ____ Sto. ____ Dom. ____
Misc. ____ Mun. X Ind. ____
Map No. 576-G

SCANNED JAN 25 2017

Sheep Mountain Well No. 1

Permit UW 97415.0
Certificate of Appropriation

THE STATE OF WYOMING

Certificate of Appropriation of Ground Water

Proof No. UW07259
CR UW - 22, Page 087
Water Division No. 1, District No. 15-5

WHEREAS, CITY OF DOUGLAS, WYOMING has/have presented to the Board of Control of the State of Wyoming proof of the appropriation of ground water from the SHEEP MOUNTAIN WELL NO. 1 located in the NE1/4SE1/4 of Section 33, T.032N., R.072W., Original Survey, under Permit No. P97415.0W for Municipal use here in described, lying and being in Converse County, Wyoming.

NOW KNOW YE that the State Board of Control, under the provisions of the Statutes of Wyoming, has by an order duly made on November 16, 2016, and entered on November 22, 2016 in Order Record 96 Page 031, determined and established the priority and amount of such appropriation as follows:

Name and Address of Appropriator(s): CITY OF DOUGLAS, WYOMING, PO BOX 1030, DOUGLAS, WY, US, 82633.
Date of Appropriation (Priority) April 17, 1990;
Amount of Appropriation 1200.000 gallons per minute.

DESCRIPTION OF LAND FOR WHICH THIS APPROPRIATION IS DETERMINED AND ESTABLISHED

TWP	RNG	SEC	NE 1/4				NW 1/4				SW 1/4				SE 1/4				
			NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	TOTAL
								(SEE ATTACHED TABULATION)											

The right to water hereby confirmed and established is limited to Municipal use and the use is restricted to the place where acquired and to the purpose for which acquired.

IN TESTIMONY WHEREOF, I Patrick T. Tyrrell, President of the State Board of Control, have hereunto set my hand on November 22, 2016 and caused the seal of said Board to be hereunto affixed.

CR Comments: See the proof and the permit for the additional conditions and limitations and also for the commingling wells and surface water rights within the City of Douglas Municipal Water System.

Attest: Cheryl Timm Ex-officio Secretary

Patrick T. Tyrrell President.

TABULATION OF ADJUDICATED LANDS

CR UW - 22, Page 087
Order Record No. 96, Page 031
Permit No. P97415.0W, Proof No. UW07259

TWP	RNG	SEC	NE1/4				NW1/4				SW1/4				SE1/4				
			NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	TOTAL
Lot 5, Section 19, T.032N, R.071W, Dependent Resurvey	Water from this well is used for municipal purposes at the following point of use:																		
Lot 6, Section 19, T.032N, R.071W, Dependent Resurvey																			
Lot 7, Section 19, T.032N, R.071W, Dependent Resurvey																			
Lot 8, Section 19, T.032N, R.071W, Dependent Resurvey																			
Lot 2, Section 01, T.032N, R.072W, Dependent Resurvey																			
Lot 3, Section 01, T.032N, R.072W, Dependent Resurvey																			
Lot 4, Section 01, T.032N, R.072W, Dependent Resurvey																			
Lot 12, Section 01, T.032N, R.072W, Dependent Resurvey																			
Lot 14, Section 01, T.032N, R.072W, Dependent Resurvey																			
Lot 15, Section 01, T.032N, R.072W, Dependent Resurvey																			

Lot 16, Section 01, T.032N, R.072W, Dependent Resurvey	Water from this well is used for municipal purposes at the following point of use:
Lot 8, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 10, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 11, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 12, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 13, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 15, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 16, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 17, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 20, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 21, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 22, Section 02, T.032N, R.072W, Dependent Resurvey	
Lot 5, Section 03, T.032N, R.072W, Dependent Resurvey	
Lot 6, Section 03, T.032N, R.072W, Dependent Resurvey	

Lot 7, Section 03, T.032N, R.072W, Dependent Resurvey	Water from this well is used for municipal purposes at the following point of use:
Lot 8, Section 03, T.032N, R.072W, Dependent Resurvey	
Lot 9, Section 03, T.032N, R.072W, Dependent Resurvey	
Lot 10, Section 03, T.032N, R.072W, Dependent Resurvey	
Lot 11, Section 03, T.032N, R.072W, Dependent Resurvey	
Lot 12, Section 03, T.032N, R.072W, Dependent Resurvey	
Tract 52, T.032N, R.074W, Independent Resurvey	
Tract 38, T.032N, R.074W, Independent Resurvey	
Tract 39, T.032N, R.074W, Independent Resurvey	
Tract 40, T.032N, R.074W, Independent Resurvey	
Lot 1, Section 30, T.033N, R.072W	
Lot 2, Section 30, T.033N, R.072W	
Lot 1, Section 26, T.033N, R.073W	
Lot 2, Section 26, T.033N, R.073W	

| | | |

032N 071W 18 Dependent Resurvey	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X
032N 071W 19 Dependent Resurvey	A X	A X	A X	A X												
032N 071W 03							A X			A X						
032N 071W 08	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X
032N 071W 09					A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X
032N 071W 10											A X					
032N 071W 14											A X					
032N 071W 15					A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X
032N 071W 16	Water from this well is used for municipal purposes at the following points of use:															
	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X	A X

| | | |

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Sheep Mountain Well No. 2 Exploration Well Application

FORM UW5-37487
Rev. 6/07
FILING FEE SCHEDULE
ON REVERSE SIDE

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER
HERSCHLER BLDG., 4-E CHEYENNE, WYOMING 82002
(307) 777-6163

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

APPLICATION FOR WELLS AND SPRINGS

Note: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic and /or stock watering, will be considered as ground water appropriations.

FOR OFFICE USE ONLY

Temporary Filing No. U.W. 46-1-148W

PERMIT NO. U.W. _____
WATER DIVISION NO. 1 DISTRICT 15-5
U.W. DISTRICT Converse County

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.
ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE

NAME AND NUMBER OF WELL or SPRING: SHEEP MOUNTAIN NO 2 EXPLORATION WELL

1. Name of applicant(s) WYOMING WATER DEVELOPMENT COMMISSION Phone: 307-777-7626

2. Address of applicant(s) 6920 YELLOWTAIL ROAD CHEYENNE Wyoming 82009
(MAILING ADDRESS) (CITY) (STATE) (ZIP)

3. Name & address of agent to receive correspondence and notices BEN JORDAN
1050 NORTH 3RD STREET SUITE E LARAMIE Wyoming 82072 Phone: 307-343-5834
(MAILING ADDRESS) (CITY) (STATE) (ZIP)

4. Use to which the water will be applied:

☐ Domestic: Use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totaling one acre or less. Number of houses served?____.

☐ Stock Watering: Normal livestock use at four tanks or less within one mile of well or spring. Stockwatering pipelines and commercial feedlots are a miscellaneous use. Number of stock tanks?___ .

☐ Irrigation: Watering of any lands for agricultural purposes not covered by the definition of domestic use (large-scale lawn watering of golf courses, cemeteries, recreation areas, etc., is miscellaneous use).

☐ Municipal: Use of water in incorporated Towns and Cities. Note 1: use of water in unincorporated towns, subdivisions, improvement districts, mobile home parks, etc. is classified as miscellaneous use. Note 2: a permit may be required by the Wyoming Department of Environmental Quality (WDEQ) if the well will be classified as a public water supply under the WDEQ's rules and regulations.

☐ Industrial: Long term use of water for the manufacture of a product or production of oil/gas or other minerals (oil field water flood operations, power plant water supply, etc.). (Describe in REMARKS)

☐ Miscellaneous: Any use of water not defined under previous definitions such as stock water pipelines, subdivisions, mine dewatering, mineral/oil exploration drilling, potable supplies in office, etc. (Describe in Remarks). Note: a permit may be required by the WDEQ if the well will be classified as a public water supply under the WDEQ's rules and regulations.

☐ Coalbed Methane Water produced in the production of coal bed methane gas. Note: wells used in the production of coal bed methane gas will require a permit from the Wyoming Oil and Gas Conservation Commission.

☐ Monitor, Observation Note: a WDEQ permit may be required ☒ Test Well: (Describe in REMARKS)

5. Location of the well or spring: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: SE 1/ 4 NW 1/ 4 of Sec. 12, Township 14 North, Range 68 West.)
Converse County, SW 1/4 NE 1/4 of Sec. 33 , T. 032N , R. 072W of the 6th P.M. (W.R.M.), Wyoming. If located in a platted subdivision, also provide Lot/Tract ___ Block ___ of the _____ Subdivision (or Add'n) of _____ . Resurvey Location: Tract _____ , (or Lot) _____ .

6. Estimated depth of the well or spring is 1350 feet. Estimated production interval is 550 ft. to 1350 ft.

7. (a) MAXIMUM instantaneous flow of water to be developed and beneficially used: 0 gallons per minute. NOTE: if for domestic and / or stock use, this application will be processed for a maximum of 25 gallons per minute. For a spring, after approval of this application, some type of artificial diversion or improvement must be constructed to qualify for a water right.

(b) MAXIMUM volumetric quantity of water to be developed and beneficially used per calendar year: 0 gallons .
Circle appropriate units: (Gallons) (Acre Feet) A four person family utilizes approximately one (1) acre-foot of water per year or 325,000 gallons.

8. Mark the point(s) or area(s) of use in the tabulation box below. Note: Upper row refers to the quarter of the section. Next row refers to the quarter of the quarter section.

TABULATION BOX

TWP	RNG	SEC	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
Unknown																			
032N	072W	33			X A														
																		Total:	X

SEE REVERSE SIDE

Permit No. U.W. _____ **Book No.** _____ **Page No.** _____

9. If for irrigation use:
   a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation box above.
   b. ☐ Land will be irrigated from this well only.
   c. ☐ Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.

10. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc.: _____

11. The well or spring is to be constructed on lands owned by WYOMING WATER DEVELOPMENT COMMISSION
(The granting of a permit does not constitute the granting of a right-of-way. If any easement or right-of-way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not the co-applicant.)

12. The water is to be used on lands owned by N/A
(If the landowner is not the applicant, a copy of the agreement relating to the usage of the appropriated water on the land should be submitted to this office. If the landowner is included as co-applicant on the application, this procedure need not be followed.) NOTE: Water rights attach to the area(s) and/or point(s) of use.

REMARKS: This is an exploration well for the Wyoming Water Development Commission for determining yield and water quality. Landowner is Bedtick Ranch, LLP. Access agreement for well recorded with Converse County Clerk is submitted with this application.

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

BEN JORDAN
Signature of Applicant or Authorized Agent

June 24, 2022
Date

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES (Domestic use is defined as use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totalling one acre or less.)	$50.00
COAL BED METHANE USE	$50.00
IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS USES	$75.00
MONITOR(For water level measurements or chemical quality sampling) or TEST WELL USES	No Fee

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING)
) ss.
STATE ENGINEER'S OFFICE)

This instrument was received and filed for record on the 24 day of June, A.D. 20 22, at 10:33 o'clock A M.

Permit No. U.W. _____

for State Engineer

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.
Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.
If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use without loss of water into sub-surface formations or at the land surface.
Coal Bed Methane wells have Additional Conditions and Limitations on attachment sheet.

Approval of this application may be considered as authorization to proceed with construction of the proposed well or spring. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of the beneficial use of water for the purposes specified in Item 4 of this application will be made by

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water to beneficial use.

Witness my hand this _____ day of _____, A.D. 20_____.

Brandon Gebhart, State Engineer

Sheep Mountain Well No. 2
Exploration Well

Permit UW 217234.0
Priority Date: 6/24/2022
No Appropriation (Test Well)

06/24/22 10:33 AM

FORM UW5-37487
Rev. 6/07
FILING FEE SCHEDULE
ON REVERSE SIDE

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER
HERSCHLER BLDG., 4-E CHEYENNE, WYOMING 82002
(307) 777-6163

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

APPLICATION FOR WELLS AND SPRINGS

Note: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic and /or stock watering, will be considered as ground water appropriations.

FOR OFFICE USE ONLY

Temporary Filing No. U.W. 46-1-148W

PERMIT NO. U.W. **217234**
WATER DIVISION NO. 1 DISTRICT 15-5
U.W. DISTRICT Converse County

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.
ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE

NAME AND NUMBER OF WELL or SPRING: SHEEP MOUNTAIN NO 2 EXPLORATION WELL

1. Name of applicant(s): WYOMING WATER DEVELOPMENT COMMISSION Phone: 307-777-7626

2. Address of applicant(s): 6920 YELLOWTAIL ROAD (MAILING ADDRESS) CHEYENNE (CITY) Wyoming (STATE) 82009 (ZIP)

3. Name & address of agent to receive correspondence and notices: BEN JORDAN
1050 NORTH 3RD STREET SUITE E (MAILING ADDRESS) LARAMIE (CITY) Wyoming (STATE) 82072 (ZIP) Phone: 307-343-5834

4. Use to which the water will be applied:

☐ Domestic: Use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totaling one acre or less. Number of houses served?____.

☐ Stock Watering: Normal livestock use at four tanks or less within one mile of well or spring. Stockwatering pipelines and commercial feedlots are a miscellaneous use. Number of stock tanks?___ .

☐ Irrigation: Watering of any lands for agricultural purposes not covered by the definition of domestic use (large-scale lawn watering of golf courses, cemeteries, recreation areas, etc., is miscellaneous use).

☐ Municipal: Use of water in incorporated Towns and Cities. Note 1: use of water in unincorporated towns, subdivisions, improvement districts, mobile home parks, etc. is classified as miscellaneous use. Note 2: a permit may be required by the Wyoming Department of Environmental Quality (WDEQ) if the well will be classified as a public water supply under the WDEQ's rules and regulations.

☐ Industrial: Long term use of water for the manufacture of a product or production of oil/gas or other minerals (oil field water flood operations, power plant water supply, etc.). (Describe in REMARKS)

☐ Miscellaneous: Any use of water not defined under previous definitions such as stock water pipelines, subdivisions, mine dewatering, mineral/oil exploration drilling, potable supplies in office, etc. (Describe in Remarks). Note: a permit may be required by the WDEQ if the well will be classified as a public water supply under the WDEQ's rules and regulations.

☐ Coalbed Methane: Water produced in the production of coal bed methane gas. Note: wells used in the production of coal bed methane gas will require a permit from the Wyoming Oil and Gas Conservation Commission.

☐ Monitor, Observation: Note: a WDEQ permit may be required ☒ Test Well: (Describe in REMARKS)

5. Location of the well or spring: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: SE 1/ 4 NW 1/ 4 of Sec. 12, Township 14 North, Range 68 West.)
Converse County, SW 1/4 NE 1/4 of Sec. 33, T. 032N, R. 072W of the 6th P.M. (W.R.M.), Wyoming. If located in a platted subdivision, also provide Lot/Tract ___ Block ___ of the ___ Subdivision (or Add'n) of ___ . Resurvey Location: Tract ___ , (or Lot) ___ .

6. Estimated depth of the well or spring is 1350 feet. Estimated production interval is 550 ft. to 1350 ft.

7. (a) MAXIMUM instantaneous flow of water to be developed and beneficially used: 0 gallons per minute. NOTE: if for domestic and / or stock use, this application will be processed for a maximum of 25 gallons per minute. For a spring, after approval of this application, some type of artificial diversion or improvement must be constructed to qualify for a water right.

(b) MAXIMUM volumetric quantity of water to be developed and beneficially used per calendar year: 0 gallons .
Circle appropriate units: (Gallons) (Acre Feet) A four person family utilizes approximately one (1) acre-foot of water per year or 325,000 gallons.

8. Mark the point(s) or area(s) of use in the tabulation box below. Note: Upper row refers to the quarter of the section. Next row refers to the quarter of the quarter section.

TABULATION BOX

TWP	RNG	SEC	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
									N/A										

SEE REVERSE SIDE

Permit No. U.W. **217234** Book No. **1553** Page No. **129**

9. If for irrigation use:
   a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation box above.
   b. ☐ Land will be irrigated from this well only.
   c. ☐ Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.

10. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc.: _____

11. The well or spring is to be constructed on lands owned by WYOMING WATER DEVELOPMENT COMMISSION
(The granting of a permit does not constitute the granting of a right-of-way. If any easement or right-of-way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not the co-applicant.)

12. The water is to be used on lands owned by N/A
(If the landowner is not the applicant, a copy of the agreement relating to the usage of the appropriated water on the land should be submitted to this office. If the landowner is included as co-applicant on the application, this procedure need not be followed.) NOTE: Water rights attach to the area(s) and/or point(s) of use.

REMARKS: This is an exploration well for the Wyoming Water Development Commission for determining yield and water quality. Landowner is Bedtick Ranch, LLP. Access agreement for well recorded with Converse County Clerk is submitted with this application.

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

BEN JORDAN
Signature of Applicant or Authorized Agent

June 24, 20 22
Date

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES (Domestic use is defined as use of water in 3 single family dwellings or less, noncommercial watering of lawns and gardens totalling one acre or less.)	$50.00
COAL BED METHANE USE	$50.00
IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS USES	$75.00
MONITOR(For water level measurements or chemical quality sampling) or TEST WELL USES	No Fee

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING)
) ss.
STATE ENGINEER'S OFFICE)

This instrument was received and filed for record on the 24 day of June, A.D. 20 22, at 10:33 o'clock A M.

Permit No. U.W. **217234**

KAILA WILLIS For State Engineer

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.

Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.

If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use without loss of water into sub-surface formations or at the land surface.

Coal Bed Methane wells have Additional Conditions and Limitations on attachment sheet.

This application is for test purposes only; no water will be beneficially used. The approval of this permit does not obligate the State Engineer to approve the permanent production permit. This permit will be automatically cancelled on December 31, 2024 or upon receipt of an acceptable Statement of Completion. PROOF OF APPROPRIATION AND BENEFICIAL USE OF GROUND WATER (FORM U.W. 8) IS WAIVED UNDER THIS PERMIT.

Approval of this application may be considered as authorization to proceed with construction of the proposed well or spring. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of the beneficial use of water for the purposes specified in Item 4 of this application will be made by December 31, 2024.

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water to beneficial use.

Witness my hand this 30 day of June, A.D. 20 22 .

JEREMY MANLEY For State Engineer

Sheep Mountain Well No. 2
Exploration Well Original Expiration Letter

Permit UW 217234.0
Priority Date: 6/24/2022
No Appropriation (Test Well)

State Engineer's Office

HERSCHLER BUILDING, 2-W CHEYENNE, WYOMING 82002
(307) 777-6163
seo.wyo.gov

MARK GORDON
GOVERNOR

BRANDON GEBHART
STATE ENGINEER

September 1, 2024

BEN JORDAN
1050 NORTH 3RD STREET SUITE E
LARAMIE, WY 82072

Re: Permit No: U.W. 217234.0
Facility Name: SHEEP MOUNTAIN NO 2 EXPLORATION WELL

Township 032 North, Range 072 West, Section 33, Quarter-Quarter SW1/4NE1/4

Dear Sir/Madam:

The above referenced groundwater permit expires December 31, 2024 and is at risk of cancellation.

If you have completed construction and/or beneficially used water compliant with your permit, please make sure the required forms are submitted before December 31, 2024. Forms may be obtained from the State Engineer's Office website at http://seo.wyo.gov (Application/Forms tab, Ground Water Forms and Instructions).

If you have any questions, please contact the Ground Water Division at (307) 777-6163.

Sincerely,

BRANDON GEBHART
State Engineer

Douglas Canal as Changed to Reno Maurer Pump Ditch, Thence to The Town of Douglas Pipeline

Permit 6101.0D
Priority Date: 7/7/1904
Source: North Platte River

Form S.W. 1
Rev. 12/22/2008

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the _____ day of _____, 20_____, at _____ o'clock _____ M.

_____

Recorded in Book _____ of Ditch Permits, on Page_____

Fee Paid $ _____ Map Filed _____

WATER DIVISION NO. _____ DISTRICT NO. _____ TEMPORARY FILING NO. _____

PERMIT NO. **P6101.0D**

NAME OF FACILITY : NATRONA, TOWN OF MILLS, WARDWELL WATER AND SEWER IMPACT JOINT POWERS BOARD WATER TREATM

1. Name(s), mailing address and phone no. of applicant(s) is/are JOHN MORTIN ESTATE, UNKNOWN, DOUGLAS, Wyoming, 82633, PH: 999-999-9999

See Additional Applicants continued in Remarks. E-mail address: _____
(if more than one applicant, designate one to act as Agent for the others) (See remarks for additional applicants.)

2. Name & address of agent to receive correspondence and notices _____

_____E-mail address: _____

3. (a) The use to which the water is to be applied is _____
(b) If more than one beneficial use of water is applied for, the location and ownership of the point of use must be shown in item 10 of the application and the details of the facilities used to divert and convey the appropriation must be shown on the map in sufficient detail to allow the State Engineer to establish the amount of appropriation. In multiple use applications, stock and domestic purposes are limited to 0.056 cubic feet per second.

4. The source of the proposed appropriation is North Platte River, tributary of Platte River, tributary of Missouri River

5. The point of diversion of the proposed works is located , 1.000 feet distant from the _____ corner of Section 13 T. N ., R. W ., and is in the NW1/4NE1/4 of Section 10 T. 033N ., R. 073W .
Lot _____ Block _____ Subdivision Name _____
Latitude (Decimal Degrees) 42.8500583333333 Longitude (Decimal Degrees) -105.601019444444

6. Are any of the lands crossed by the proposed facility owned by the State or Federal government? If so, describe lands and indicate whether State or Federally owned.

7. The carrying capacity of the ditch, canal, pipeline or other facility at the point of diversion is -1 cubic feet per second (c.f.s.)

8. The accompanying map is prepared in accordance with the State Engineer's Rules and Regulations for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

9. The estimated time required for the completion of construction is Two Years, and to complete the application of water to the beneficial uses stated in this application is Two Years.

10. The land to be irrigated under this permit is described in the following tabulation. (Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

Town-	Range	Sec.	NE¼				NW¼				SW¼				SE¼				
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Number of acres to receive original supply 0.00

Number of acres to receive supplemental supply 0.00

Total number of acres to be irrigated 0.00

REMARKS

I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

FOR JOHN MORTIN ESTATE

Printed Name and Signature of Applicant or Agent

Date

THE STATE OF WYOMING } ss.
STATE ENGINEER'S OFFICE

TEMPORARY FILING NO. _____

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

The time for completing the construction work shall terminate on September 24, 1954

The notice of beneficial use has been waived.

Witness my hand this 9th day of July, A.D. 1904

_____

PERMIT NO. P6101.0D

PERMIT STATUS

Priority Date July 7, 1904 Approval Date July 9, 1904

7-20-1906	Assignment of all interests from J.D.F. Richards to Douglas Canal Company. Miscellaneous Records Book 3, Pages 64-65.
2-25-1911	Amended maps and land description approved February 25, 1911.
3-25-1929	Assignment of a proportionate interest from Douglas Canal Company to John Morton Estate of Douglas, WY. Miscellaneous Records Book 7, Pages 494-495.
9-27-1939	Assignment of part interest from Douglas Canal Company to Fred C. Metz and Henry Metz Estate. Miscellaneous Record Book 8, Page 398. (Metz lands now owned by Julian H. Guthrie, Douglas, WY)
10-9-1939	Petition for change of point of diversion and means of conveyance - Douglas Canal to Metz Pump Ditch and Timm Pump Ditch. Miscellaneous Records Book 8, Pages 400-402. (Map under Permit No. 19233.)
3-28-1941	Warranty Deed. Fred C. and Edith Metz to Julian Guthrie. Miscellaneous Records Book 8, Page 438.
11-21-1941	Petition for change of point of diversion and means of conveyance. Douglas Canal Company to Chamberlin No. 1 Pump Ditch. Miscellaneous Records Book 8, Page 447. See Map under Permit No. 19707.
6-30-1942	Assignment of interest from Douglas Canal Company to C. H. Hoffmann. Miscellaneous Notices, Permit No. 6101.
7-3-1942	Petition for change in point of diversion and means of conveyance. Douglas Canal to South Douglas Ditch. Miscellaneous Notices, Permit 6101. Map filed in Book D-7.
11-14-1950	Assignment from Mortons, Inc., successor and interest to the Douglas Canal Company to Clive D. and Margaret Anderson. Miscellaneous Records Book 9, Page 142.
1-13-1951	Assignment from Clive D. and Margaret Anderson to A. G. Sims. Miscellaneous Records Book 9, Page 143.
3-5-1951	Assignment from Clive D. and Margaret Andeson to T. C. Daniels, Executor of H.R. Daniels Estate. Miscellaneous Records Book 9, Page 148.
3-5-1951	Petition for change in point of diversion and means of conveyance from Douglas Canal to South Douglas Canal. Miscellaneous Notices, Permit No. 6101. Amended Map filed in back of Map Book D-9.
7-24-1951	Assignment from H. R. Daniels Estate to Albert G. Sims. Miscellaneous Records Book 9, Page 158.

NOTICE

This permit does not constitute a complete water right. It is your authority to begin construction work.

All appropriations for irrigation are limited to 1 cubic foot per second of time for each 70 acres of land irrigated, except as provided in Section 41-4-320, Wyoming Statutes, 1977. Appropriations for other uses are limited to the amount of water beneficially used in accordance with the terms of the permit.

Notice of completion of work and of application of the water to the beneficial uses described in the permit, must be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

To perfect your water right, your Water Division Superintendent, or his authorized representative, will contact you after you have submitted notice to the State Engineer stating that you have applied the water to the beneficial uses described in your permit. After execution of the proof, it will be considered by the State Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Appropriation which will constitute a completed water right.

The granting of a permit does not constitute the granting of right-of-way. If any right-of-way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

PERMIT NO. P6101.0D

PERMIT STATUS

Priority Date July 7, 1904 Approval Date July 9, 1904

9-14-1951	Petition of Fred and Helen Marburger to eliminate lands under Douglas Canal. Miscellaneous Notices, Permit No. 6101.
9-28-1951	Petition of West Douglas Land Co., School District No. 17, and Converse County High School for change in point of diversion and means of conveyance from Douglas Canal to the Maurer Pump Ditch and to amend the land description. Miscellaneous Notices, Permit No. 6101. Map filed in back of Book D-9.
12-24-1951	Petition of LeRoy N. Combs for change in point of diversion and means of conveyance from Douglas Canal to Doyle No. 2 Ditch. Miscellaneous Notices, Permit No. 6101. Map filed in back of Book D-9.
12-24-1951	Assignment from Mortons, Inc. to LeRoy N. Combs. Miscellaneous Records Book 9, Page 167.
12-31-1951	Assignment from Mortons, Inc. to William J. and Lucy S.Smith and Lillian Smith Jones. Miscellaneous Records Book 9, Page 167.
1-4-1952	Petition of William J. and Lucy S. Smith and Lillian Smith Jones for change in point of diversion and means of conveyance from Douglas Canal to William Smith No. 1 Ditch. Miscellaneous Notices, Permit No. 6101. Map filed in back of Book D-9.
4-16-1952	Petition of Albert G. Sims for change in point of diversion and means of conveyance from Douglas Canal to Chamberlain No. 2 Pump Ditch and amendment of land description. Miscellaneous Notices, Permit No. 6101. Map filed in back of Book D-9.
10-21-1952	Assignment from Mortons, Inc. to Theodore C. and Leslie B. Daniels. Miscellaneous Records Book 9, Page 193.
12-24-1953	Notice of Completion of Beneficial Use received for lands of West Douglas Land Company. See letter from R. C. Maurer dated December 23, 1953 for description of lands.
9-30-1954	Notice of Completion on September 29, 1954, received.
12-5-1960	Notice of partial completion of beneficial use on August 1, 1960 received from R. C. Maurer and W. J. Wesnitzer.
11-27-1992	EXCHANGE PETITION, S.E. DOCKET NO. 1992-10-1, GRANTED for the accounting of water along the North Platte River system including Pathfinder Res., Permit No. 609R, and Glendo Res., Permit No. 5998R, to allow direct flow water to pass through Pathfinder Res. and outlet works for diversion and use at the WY Steam Electric Generating System Intake (Dave Johnston Power Plant) during the winter season (Oct. 1-Apr. 30) in exchange for the restorage of an equal volume of water in Glendo Res. in the summer season (May 1-Sept 30). The maximum amount exchanged is 20 cubic feet per second (cfs) up to a total seasonal volume of 3007 acre-feet. Any call for regulation fo fill Pathfinder Res. will be ajusted to reflect the volume of water exchanged as authorized under the State Engineer Order granting SED No. 1992-10-1. Water used during the winter season will be replaced (exchanged) by water under the Douglas Canal, Permit No. 6101, transferred to the WY Steam Electric Generating System Intake under Board of Control Docket No. I-1991-1-6. The replacement water will be measured at the Orin USGS streamflow gauge at a maximum flow rate of 13.0 cfs. If the calculated natural flow at the Orin gauge falls below 13.0 cfs, no replacement credit will be given for that day. Any direct flow water remaining under BOC Docket No. I-1991-1-6 not used in the exchange/replacement approved by the State Engineer can be used in accordance with Board of Control OR 40, Pages 393-422. The accounting of water stored at Glendo Res., Permit No. 5998R, will be adjusted to allow the replacement (exchanged) water measured at the Orin Gauge to be placed into the Pathfinder Res. restorage account during the summer period (May 1-Sept 30) up to the maximum volume of 3007 acre-feet. Recorded in Miscellaneous Record Book 14, Pages 165-181 and Petition Map is in the back of Map Drawer E-24.

PERMIT NO. P6101.0D

PERMIT STATUS

Priority Date July 7, 1904 Approval Date July 9, 1904

1-3-2000	A correction was made to SEO Petition #92-10-1, granted November 27, 1992. The recorded Miscellaneous Records book was changed from Book 10, to Book 14, Pages 165-181. This correction has been made in the original Endorsement screen 2/8/2000.
12-9-2005	The 35 acres in Lot 4, Section 11, Township 33 North, Range 72 West are hereby restored to this permit. No evidence of consent could be found for elimination of these lands from the permit in 1952 when an amended land description was accepted for the permit.
9-1-2006	Petition SE DOCKET NO. 2006-05-1, DENIED for change in point of diversion and means of conveyance. T33N R72W Sec. 9: Lot 7, Lot 8, Lot 9, SWSE. Total of 92.99 acres. These lands were effectively eliminated from the permit December 9, 1952.
9-1-2006	Petition SE DOCKET NO. 2006-06-1, DENIED for change in point of diversion and means of conveyance. T33N R72W, Sec. 10: Lot 3, Lot 4, Lot 5, NWSW, SENW. Total 113.18 acres. These lands were effectively eliminated from the permit on February 25, 1911.
9-1-2006	Petition SE Docket No. 2006-07-01, GRANTED for change in point of diversion and means of conveyance for the following lands: T33N, R72W, Sec. 11: Lot 4 35.0 acres. From the record point of diversion described as N52° 55'W, 2508 feet from the ¼ corner common to Sections 10 and 11, T33N, R73W and situated in the NWNE, Sec. 10, T33N, R73W to a new point of diversion described as N33°30'E, 5062 feet from the SW corner of Sec. 11, T33N, R72W known as the Duck Blind Pump and Pipeline. See corporate minutes and ownership filed in Miscellaneous Notices under the permit. Petition map filed in the back of drawer E-26 under Permit No. 6101. Petition recorded in Miscellaneous Records Book No. 15, pages 450-455.
1-19-2007	EXCHANGE PETITION, S.E. DOCKET NO. 2005-18-01, GRANTED for the accounting of water along the North Platte River system including Pathfinder Res, Permit No. 609 Res. and Glendo Res., Permit No. 5998 Res., to allow natural flow water to pass through Pathfinder Res. and outlet works for diversion and use at the town of Mills during the non-irrigation season (Oct. 1-Apr. 30) in exchange for the restorage of an equal volume of water in Glendo Res. during the irrigation season (May 1-Sept. 30). The maximum amount exchanged is 114.5 acre-feet at a rate of 0.84 cfs (rounded up to 1.0 cfs for accounting purposes). Any call for regulation to fill Pathfinder Res. will be adjusted to reflect the volume of water exchanged as authorized under the State Engineer Order granting this exchange petition. Water used during the non-irrigation season will be replaced (exchanged) by water under the Douglas Canal, Permit No. 6101, transferred to the town of Mills (Board of Control Docket Nos. I-1989-1-4 and I-1990-3-7 and Order Record No. 36, Pages 20, 36 and 526). The replacement water will be measured at the Orin USGS streamflow gauge at a maximum flow rate of 14.0 cfs (13 cfs + 1cfs----See Exchange Petition under S.E. Docket No. 1992-10-1, granted on November 27, 1992). If the calculated natural flow at the Orin gauge falls below 14.0 cfs, no replacement credit will be given for that day. Any direct flow water remaining under BOC Docket Nos. I-1989-1-4 and I-1990-3-7, not used in this exchange/replacement can be used in accordance with Board of Control Order Record No. 36, Pages 20, 36 and 526. The accounting of water stored at Glendo Res., Permit No. 5998 Res., will be adjusted to allow the replacement/exchange water measured at the Orin gauge to be placed into the Pathfinder Reservoir re-storage account during the irrigation season up to the maximum volume of 114.5 acre-feet. This petition is recorded in Miscellaneous Records Book 16, Pages 7-23 and the petition map is filed in the Back of Drawer E-26 under Permit Number 6101.
5-6-2013	PETITION, S.E. DOCKET NO. 2009-50-1, GRANTED for change in place of use for a portion of Permit No. 6101D, the Douglas Canal, diverting from the North Platte River. The granting of this petition changes the place of use from the following described lands: T33N, R72W, Original Survey, Sec. 11: Lot 4 35 acres to the following lands: T33N, R72W, Original Survey, Sec. 11: 34.33 acres Lot 4; and 0.7 acres NESW (Total 35.0 acres). Hereby terminated are the domestic and power generation uses under these above lands. Petition map filed in back of drawer E-29 under Permit No. 6101D. Petition recorded in Miscellaneous Record Book No. 16, Pages 414-417.
5-5-2015	AMENDED PETITION, SE DOCKET NO. 2015-02-1, GRANTED for change in Point of Diversion for 35 acres described under Permit No. 6101, the Douglas Canal as changed to Duck Blind Pump and Pipeline. Petition recorded in Miscellaneous Record Book No. 17, Pages 120-122. Petition map is filed in back of map drawer D-19 under Permit No. 6101.

REMARKS CONTINUATION SHEET 1

T.F. No._____

(APPLICANT INFORMATION CONTINUED)

DOUGLAS CANAL CO, UNKNOWN, DOUGLAS, Wyoming 82633;
JULIAN H GUTHRIE, UNKNOWN, DOUGLAS, Wyoming 82633;
MORTON INC, UNKNOWN, DOUGLAS, Wyoming 82633;
WILLIAM SMITH, 207 N. 4TH ST., DOUGLAS, Wyoming 82633;
LUCY SMITH, UNKNOWN, DOUGLAS, Wyoming 82633;
LILLIAN SMITH, UNKNOWN, DOUGLAS, Wyoming 82633;
WEST DOUGLAS LAND CO, UNKNOWN, DOUGLAS, Wyoming 82633;
CONVERSE COUNTY HIGH SCHOOL, UNKNOWN, DOUGLAS, Wyoming 82633;
LEROY COMBS, UNKNOWN, DOUGLAS, Wyoming 82633;
T C DANIELS, UNKNOWN, DOUGLAS, Wyoming 82633;
LESLIE DANIELS, PO BOX 67, DOUGLAS, Wyoming 82633;
ALBERT SIMS, 214 N. 5TH, DOUGLAS, Wyoming 82633;
CLIVE ANDERSON, RR 6, DOUGLAS, Wyoming 82633;
MARGARET ANDERSON, UNKNOWN, DOUGLAS, Wyoming 82633;
IRIS ANDERSON, UNKNOWN, DOUGLAS, Wyoming 82633, AND
HARRY ANDERSON, UNKNOWN, DOUGLAS, Wyoming 82633.

Douglas Canal as Changed to Reno Maurer Pump Ditch, Thence to The Town of Douglas Pipeline

Permit 6101.0D
Certificate of Appropriation

Limited to 263.52 ac-ft/yr during irrigation season (May 1 to September 30)

AMENDED

THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 25267
Certificate Record No. 73, Page 365
Water Division No. 1, District No. 14

WHEREAS, Town of Douglas (as successor to West Douglas Land Company) has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from North Platte River through the Douglas Canal (as changed to Reno-Maurer Pump Ditch, thence to Town of Douglas Pipeline) Ditch under Permit No. 6101 for municipal purposes ~~for irrigation of the lands herein described~~, lying and being in Converse County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made and entered on the 21st day of May, A. D. 1981, in Order Record No. 24, Page 360, determined and established the ~~priority~~ and amount of such appropriation as follows:

Name of Appropriator Town of Douglas; Postoffice Address Douglas 82633, Wyoming;
Date of Appropriation July 7, 1904; Total Acreage None;
Amount of Appropriation *1.23 cu. ft. per sec.; Description of land ~~to be irrigated and~~ for which this appropriation is determined and established:

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			This appropriation is changed to municipal purposes for use within the corporate																
			limits of the Town of Douglas described as follows:																
32N	71W	4	Lot 5																
32N	71W	5	Lots 2, 3 and 4																
32N	71W	7													X				
32N	71W	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
32N	71W	9			X		X	X	X	X	X	X	X	X	X	X	X	X	
						(Continued on attached tabulation)													

THIS AMENDED CERTIFICATE IS ISSUED IN LIEU OF THE ORIGINAL CERTIFICATE OF APPROPRIATION OF RECORD IN CERTIFICATE RECORD 63, PAGE 307, AND AMENDS THE ORDER OF ADJUDICATION OF RECORD IN ORDER RECORD 13, PAGE 84, PROOF NO. 25267.

Head Gate: Section 8: NW¼NE¼ Township 32 North, Range 71 West

The right to water hereby confirmed and established is limited to ~~irrigation~~ municipal purposes and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot of water per second for each seventy acres of land for which the appropriation is herein determined and established, except when there is surplus water in the stream as provided by Sections 41-181 to 41-189, Wyoming Statutes, 1957.

IN TESTIMONY WHEREOF, I, George L. Christopulos, President of the State Board of Control, have hereunto set my hand this 21st day of May, A. D. 1981, and caused the seal of said Board to be hereunto affixed.

Attest: Frank A. Chavez Ex-officio Secretary.

George L. Christopulos President.

TABULATION OF ADJUDICATED LANDS

Certificate Record No. U.W. 73 , Page 365
Order Record No. 24 , Page 360
Permit No.U.W. 6101 Proof No.U.W. 25267

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
32N	71W	10											X						
32N	71W	15					X	X	X	X	X								
32N	71W	16	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	
32N	71W	17	X																

* The quantity shown is the amount changed to municipal use under this appropriation and represents a daily diversion and depletion allowance during the irrigation season, May 1 through September 30, not to exceed 263.52 acre-feet per year.

Douglas Canal as Changed to Reno Maurer Pump Ditch, Thence to The Town of Douglas Pipeline

Permit 6101.0D
Change of Use Order

Changes beneficial use from irrigation to municipal use

IN THE MATTER OF THE PETITION OF THE TOWN OF DOUGLAS FOR CHANGE IN USE AND POINT OF DIVERSION AND MEANS OF CONVEYANCE OF A PORTION OF THE WEST DOUGLAS LAND COMPANY APPROPRIATION, DIVERTING FROM THE NORTH PLATTE RIVER, THROUGH THE DOUGLAS CANAL, AS PREVIOUSLY CHANGED TO THE RENO-MAURER PUMP DITCH, WITH A PRIORITY OF JULY 7, 1904; TO THE TOWN OF DOUGLAS PIPELINE. (O.R. 13, P. 84; C.R. 63, P. 307; PROOF NO. 25267, PERMIT NO. 6101)

DOCKET NUMBER I-77-1-17
IN WATER DIVISION NUMBER ONE

PETITIONER: TOWN OF DOUGLAS, COUNTY OF CONVERSE, STATE OF WYOMING, 82633, A MUNICIPAL CORPORATION ACTING THROUGH ITS MAYOR, MR. CARL NAUTA.

This matter was considered by the State Board of Control at its regular meeting on June 6, 1978, with the following results:

FINDINGS OF FACT

1. THAT the petitioner is owner of the right to use of water from the water right involved as evidenced by a water right deed and the option & agreement which accompanied the petition.

2. THAT the appropriation involved is the West Douglas Land Company Appropriation, Permit No. 6101, adjudicated under Proof No. 25267, diverting from the North Platte River through the Douglas Canal, as previously changed to the Reno-Mauer Pump Ditch, with a priority of July 7, 1904, and of record in Order Record 13, page 84; Certificate Record 63, page 307, which describes the lands irrigated as follows:

(NOTE: The above right was originally filed as supplemental supply to lands with original supply adjudicated under Permit No. 1430 Enl., the LaPrele Ditch for direct flow diverting from LaPrele Creek and for stored water from LaPrele Reservoir, Permit Nos. 728 Res., and 1581 Res., and with supplemental supply from various sources under the LaPrele Project. However, in 1955, the North Platte right was adjudicated as original supply and has been used as such over a period of many years. A separate petition, Board of Control Docket No. I-78-4-5, resolves this conflict in adjudication by abandoning the LaPrele and supplemental supply rights.)

Township 32 North, Range 71 West			
Section 5:	Lot 2	30.00	Acres
	Lot 3	36.00	
	Lot 4	5.00	
Section 8:	NW1/4NE1/4	17.00	
	NE1/4NW1/4	35.00	
	NW1/4NW1/4	6.00	
TOTAL		129.00	Acres (1.84 c.f.s.)

3. THAT the petitioner, the Town of Douglas, seeks to detach the water right from the 86 acres of lands actually irrigated of the total of 129 acres of lands described in the above appropriation, and to change the use of same from irrigation to preferred use for general municipal purposes. The irrigated lands from which water rights are to be detached (86 acres) and the lands not irrigated (43 acres) are described as follows:

IRRIGATED LANDS			
Township 32 North, Range 71 West			
Section 5:	Lot 2	30.00	Acres
	Lot 3	18.00	
Section 8:	NW1/4NE1/4	4.00	
	NE1/4NW1/4	28.00	
	NW1/4NW1/4	6.00	
TOTAL		86.00	Acres
		(1.23 c.f.s.)	

NON-IRRIGATED LANDS			
Township 32 North, Range 71 West			
Section 5:	Lot 3	18.00	Acres
	Lot 4	5.00	
Section 8:	NW1/4NE1/4	13.00	
	NE1/4NW1/4	7.00	
TOTAL		43.00	Acres
		(0.61 c.f.s.)	

(The 43 acres of non-irrigated lands were voluntarily abandoned by a separate petition, Docket No. I-78-3-2, and of record in Order Record 24, page 367.)

AND further, the petitioner seeks to change the point of diversion and means of conveyance of the water right as detached and changed to municipal use from its record point of diversion through the Reno-Maurer Pump Ditch, (as previously changed from the Douglas Canal), diverting from the North Platte River at a point N. 27 degrees 40 minutes E., a distance of 1,745 feet from the southwest corner of Section 5, Township 32 North, Range 71 West, and situate in Lot 4 of said Section 5; to the Douglas Pipeline, diverting from the same source of supply at a point N. 49 degrees 58 minutes E, a distance of 1,155 feet from the southwest corner of the NW1/4NE1/4 of Section 8, Township 32 North, Range 71 West, and situate in the NW1/4NE1/4 of said Section 8.

4. THAT this petition was referred to a public hearing held in accordance with Section 41-3-104 Wyoming Statutes 1977, at Douglas, Wyoming, on the 12th day of January, 1978, conducted by the superintendent of Water Division No. 1. Due and legal notice of the time and place of the hearing was given in all respects as required by law. No protest to this petition was registered at this hearing or subsequent thereto.

5. THAT the petitioner desires to use the water as detached and changed to municipal purposes within the limits of the Town of Douglas more particularly described as follows:

Township 32 North, Range 71 West	
Section 4:	Lot 5
Section 5:	Lots 2, 3, 4
Section 7:	NE1/4SE1/4
Section 8:	W1/2, NE1/4, N1/2SE1/4, SE1/4SE1/4
Section 9:	W1/2, SW1/4NE1/4, SE1/4
Section 10:	SW1/4SW1/4
Section 15:	NW1/4, NE1/4SW1/4
Section 16:	N1/2, N1/2SW1/4, SE1/4SW1/4, SE1/4
Section 17:	NE1/4NE1/4

6. THAT a study was made which included the pumping records of the Reno-Maurer Pump Ditch, and the pattern of return flow of the right which is the subject of this petition. A copy of this study accompanied the petition and was marked exhibit "A".

7. THAT the petitioner proposes the transfer of water rights from 86 acres of land, on which the following crops were grown:

Alfalfa - 51.60 Acres
Small Grains - 8.60 Acres
Corn - 25.80 Acres

Using these acreage figures the consumptive use was determined as follows:

CONSUMPTIVE USE

MONTH	DAYS	ALFALFA (51.6 AC.)	SMALL GRAIN (8.6 AC.)	CORN (25.8 AC.)	TOTAL A/F MONTH
MAY	31	9.29 A/F	1.98 A/F	0.26 A/F	11.53 A/F
JUNE	30	19.61 A/F	3.27 A/F	6.19 A/F	29.07 A/F
JULY	31	26.32 A/F	2.92 A/F	12.38 A/F	41.62 A/F
AUG.	31	21.16 A/F		11.61 A/F	32.77 A/F
SEPT.	30	10.32 A/F		6.45 A/F	16.77 A/F
	153	86.70 A/F	8.17 A/F	36.89 A/F	131.76 A/F

Total Consumptive Use = 131.76 A/F

Assuming 50% return flows, then total water diverted would be 263.52 A/F. Records on file in the Board of Control indicate an average of 260 A/F was pumped during an average irrigation season.

Petitioner states that return flows have historically been to the North Platte River from the use of these rights for irrigation and return flows will continue to the North Platte River under a municipal use through discharge of the treated sewage effluent of the Town of Douglas to said River.

8. THAT the proposal has been field checked by the division superintendent and, in his opinion, the requested change appears logical, and without apparent harm to any other appropriators.

9. THAT there are no intervening tributaries or other sources of supply which would affect the rights of other appropriators.

10. THAT there are no intervening points of diversion which might be affected by this change.

11. THAT a properly prepared map accompanied the petition.

12. THAT the following is found in relation to this right:

a. That this right is subject to the limitations of the North Platte River Decree of October 8, 1945, and the stipulation and Decree of 1957, which limits the irrigation season to the period of May 1st, through September 30th, of each year.

b. The irrigation season is therefore 153 days.

13. THAT the granting of this petition will not injure any other appropriator.

CONCLUSIONS OF LAW

1. THAT the Board of Control has jurisdiction both to consider the petitioner's request for change in use and change in point of diversion and means of conveyance and to prepare and promulgate the order hereinafter set forth disposing of said petition.

2. THAT the Findings of Fact satisfy the requirements of Section 41-3-104, Wyoming Statutes 1977, pertaining to change in use and the petition should be granted.

ORDER

IT IS HEREBY ORDERED THAT this petition be and the same is GRANTED without loss of priority and subject to the condition that the change shall not adversely affect the rights of other appropriators in good standing at the time the change is made.

IT IS FURTHER ORDERED THAT the petitioner be allowed to change the use of water from 86 acres of the 129 acre, West Douglas Land Company appropriation, from irrigation to preferred use for general municipal use within the corporate limits of the Town of Douglas with points of use described as follows:

Township 32 North, Range 71 West

Section 4: Lot 5
Section 5: Lots 2, 3, 4
Section 7: NE1/4SE1/4
Section 8: W1/2, NE1/4, N1/2SE1/4, SE1/4SE1/4
Section 9: W1/2, SW1/4NE1/4, SE1/4
Section 10: SW1/4SW1/4
Section 15: NW1/4, NE1/4SW1/4
Section 16: N1/2, N1/2SW1/4, SE1/4SW1/4, SE1/4
Section 17: NE1/4NE1/4

The lands from which water is to be detached are described as follows:

Township 32 North, Range 71 West			
Section 5:	Lot 2	30.00	Acres
	Lot 3	18.00	
Section 8:	NW1/4NE1/4	4.00	
	NE1/4NW1/4	28.00	
	NW1/4NW1/4	6.00	
Total		86.00	Acres (1.23 c.f.s.)

FURTHER THAT the petitioner be allowed to change the point of diversion and means of conveyance of this water as changed to municipal use from its record point of diversion described as N. 27 degrees 40 minutes E., a distance of 1,745 feet from the southwest corner of Section 5, Township 32 North, Range 71 West, and situate in Lot 4 of said Section 5, to the Douglas Pipeline, diverting from the same source at a point N. 49 degrees 58 minutes E., a distance of 1,155 feet from the southwest corner of the NW1/4NE1/4 of Section 8, Township 32 North, Range 71 West and situate in the NW1/4NE1/4 of said Section 8.

IT IS FURTHER ORDERED THAT the following conditions and guide lines will prevail in the administration of this change.

1. The maximum period during which the transferred right may be exercised shall be from May 1 through September 30 (153 days).

2. The maximum quantity of water which shall be transferred is based on the consumptive use factors as applied to a total of 86.0 acres of historically irrigated lands and shall not exceed a maximum of 263.52 acre-feet per year.

3. The maximum daily net diversion rate is not to exceed 1.23 c.f.s., which is based at the rate of 1 c.f.s. of 70 acres.
(Note: At a uniform rate of diversion the diversion rate would be 0.85 c.f.s. for 153 days.)

4. The maximum daily diversion entitlement shall be that amount of water available at the headgate in priority and not to exceed 1.23 c.f.s. or 2.44 acre-feet per day, and will be allowed during the period of May 1 through September 30 or until they reach the maximum of 263.52 acre-feet.
Note: At the rate of diversion of 1.23 c.f.s. the 263.52 acre-feet will be diverted in 108 days.

5. The petitioner should not be assessed for loss of return flows as these return flows will continue to be returned to the North Platte River, at approximately the same rate, through the sewage effluent system of the Town of Douglas.

However, any changes or reduction in the return flows from the sewage effluent system will cause the State Board of Control to adjust the diversion rate. In the case of total containment of the sewage return flows, the petitioner will be limited to a maximum diversion rate of 0.61 c.f.s. - 131.76 A/F annually, which allows for a 50% return flow.

6. THAT this acreage is to still be reported under the North Platte Acreage count as 86.0 acres of irrigated land.

IT IS FURTHER ORDERED THAT an amended certificate of appropriation be issued as follows:

Certificate Record Book	Certificate Record Page	Proof No.	Permit No.	Name of Facility	Name of Appropriator	Address	Date of Appropriation	Use For Which Appropriated	Amt. of Appro. C.F.S.	No. of Acres
73	365	25267	6101	Douglas Canal (as changed to Reno-Maurer Pump Ditch, thence changed to Town of Douglas Pipeline NW1/4NE1/4 Sec. 8)	Town of Douglas (as successor to West Douglas Land Company)	Douglas, WY 82633	July 7, 1904	Mun.	*1.23	

This appropriation is changed to municipal purposes for use within the corporate limits of the Town of Douglas described as follows:

Township 32 North, Range 71 West
Section 4: Lot 5
Section 5: Lots 2, 3, 4
Section 7: NE1/4SE1/4
Section 8: W1/2, NE1/4, N1/2SE1/4, SE1/4SE1/4
Section 9: W1/2, SW1/4NE1/4, SE1/4
Section 10: SW1/4SW1/4
Section 15: NW1/4, NE1/4SW1/4
Section 16: N1/2, N1/2SW1/4, SE1/4SW1/4, SE1/4
Section 17: NE1/4NE1/4

*The quantity shown is the amount changed to municipal use under this appropriation and represents a daily diversion and depletion allowance during the irrigation season, May 1 through September 30, not to exceed 263.52 acre-feet per year.

DONE AT CHEYENNE, COUNTY OF LARAMIE, STATE OF WYOMING, THIS 6th DAY OF June 1978.

STATE BOARD OF CONTROL

George L. Christopulos

GEORGE L. CHRISTOPULOS, PRESIDENT

ATTEST:

Paul C. Schwieger

PAUL C. SCHWIEGER, EX-OFFICIO SECRETARY

ENTERED: May 21, 1981

Douglas Pipeline

Permit 9903.0D
Priority Date: 6/15/1910
Source: North Platte River

85
9903 - completed.

Application for a Permit to Divert and

Cert. Record 44 P. 1 Ac. 4.5 Cu. Ft.

The S. A. Bristol Co., Printers and Binders, Cheyenne

Proof submitted.
APR 1924

Water Division No. 1 District No.

I, Town of Douglas, of , County of Converse, State of Wyoming, being duly sworn according to law, upon my oath say:

1. The name of the applicant Town of Douglas.

2. The postoffice address of the applicant Douglas, Wyo.

3. The use to which the water is to be applied is Municipal uses.

4. The name of the ditch or canal is Douglas Pipeline

5. The source of the proposed appropriation is North Platte River

6. The headgate of the proposed ditch or canal is located 1870' S. 89°-15' W, 320' N. 62°-45' W. from 1/4 corner on west side of Section 9, Township 32 N, Range 71 W. *

7. The said ditch or canal is to be miles long and to pass through the following lands (give route by courses and distances, or by naming legal subdivisions crossed)

The pumping plant will deliver 2,000,000 gallons per day (minute). It has a fifteen ft. lift at the pumps and then pumps against a 200' head to the reservoirs.
The delivery pipes are 6" and 12"
The pumps consist of one gardner 12" x 18" x 9" x 12" and one Deane 12" x 18½" x 10½" x 10.

8. The dimensions of said works are: (a) [At headgate] Width on top (at water-line) feet; width on bottom feet; depth of water feet; grade feet per mile.

(b) Give dimensions at each point where reduced in size, stating miles from headgate:

[At] width on top (at water-line) feet; width on bottom feet; depth of water feet; grade feet per mile.

[At] width on top (at water-line) feet; width on bottom feet; depth of water feet; grade feet per mile.

[At] width on top (at water-line) feet; width on bottom feet; depth of water feet; grade feet per mile.

9. Describe the character of proposed works, stating: 1st. The nature of material to be moved. 2nd. Number and length of tunnels, if any. 3rd. Amount of fluming, if any.

10. The estimated cost of said ditch is Dollars.

11. The land to be irrigated has a total area of acres, described as follows (Give estimated acreage in fractions of subdivisions:)

12. Construction will begin on proposed works on or before , 191

13. The time required for the completion of ditches and other distributing works is year from , 191

14. The time required to complete the application of water to the beneficial use stated in this application is year from , 191

15. A map of the proposed ditch or canal, prepared in accordance with Chapter 14, R. S. 1899, accompanies this application.

Signed: Town of Douglas.
By E. Erwin Mayor.

NOTE.—*The statements in the foregoing application must comply with the requirements of Chapter 14, R. S. 1899.*

Appropriate the Water of the State of Wyoming

THE STATE OF WYOMING,
COUNTY OF Converse } ss.

I hereby certify that the foregoing application was signed in my presence and sworn to before me by

B. J. Erwin, Mayor this 14 day of June, 1910

F. H. De Castro
Notary Public
Seal. My Commission Expires Dec 22, 1912

Notice of expiration mailed SEP 13 1912

Notice of completion received JAN 4 1913

* Petition for change in point of diversion to a point located S. 52°50' E. 1296 feet from the north quarter-corner of Sec. 8, T. 32 N., R. 71 W., approved and granted this 25th day of February, A. D. 1924, subject to the condition that no other existing appropriations from the same source shall be injured by said change. See petition filed under Miscellaneous Notices, Permit No. 9903; amended map filed in Book B-3.

Frank B. Emerson
State Engineer.

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE. } ss.

This is to certify that I have examined the foregoing application and have returned the same without my approval for the following reasons:

Witness my hand this ..... day of ....., A. D. 191.....

State Engineer.

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE. } ss.

This is to certify that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

Preferred use.

Construction of proposed works shall begin within one year from date of approval.

The time for completing the work shall terminate on December 31, 1912.

The time for completing the appropriation of water for beneficial use shall terminate on December 31, 1915.

The amount of the appropriation shall be limited to ~~one cubic foot per second of time for each seventy acres of land reclaimed on or before December 31, 1915, and the additional~~ volume used for municipal purposes on or before ~~said date.~~ Dec. 31. 1915.

Witness my hand this 8th day of July, A. D. 1910

Clarence T. Johnston.
State Engineer.

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } ss.

This instrument was received and filed for record on the 15th day of June, A. D. 1910, at 9:00 o'clock A. M., and duly recorded in Book 32 of Applications on Page 85.

Clarence T. Johnston
State Engineer.

Douglas Pipeline

Permit 9903.0D
Certificate of Appropriation

18259

THE STATE OF WYOMING

CERTIFICATE OF APPROPRIATION OF WATER

Certificate Record No. 44 Page 1

Whereas, Town of Douglas has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from North Platte River tributary of ..... through the Town of Douglas Pipeline 10/18/79 jac ~~Ditch~~ under Permit No. 9903 for ~~irrigation~~ municipal purposes ~~of the lands herein described~~, lying and being in Converse County, Wyoming.

Now Know Ye, That the Board of Control, under the provisions of ~~Chapter 61, Compiled Statutes of Wyoming, 1910~~ Chapters 65 & 68, Wyoming Compiled Statutes 1920, has, by an order duly made and entered on the 17th day of April, A. D. 1924, in Order Record No. 6, Page 374, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator Town of Douglas; Postoffice Address Douglas, Wyoming; Amount of Appropriation 4.5 cu. ft. per sec.; Date of Appropriation June 15, 1910; Description of land to be irrigated and for which this appropriation is determined and established; Total Acreage .....

Twp.	Range	Sec.	NE¼				NW¼				SW¼				SE¼				Total
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
32N	71W	8		x															
				Point of diversion															

The right to water hereby confirmed and established is limited to ~~irrigation~~ 4.5 cu. ft. of water per second of time or so much thereof as may be beneficially used for municipal purposes and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot per second for each seventy acres of land for which appropriation is herein determined and established.

In Testimony Whereof, I, Frank C. Emerson, President of the State Board of Control, have hereunto set my hand this 26th day of May, A. D. 1924, and caused the seal of said Board to be hereunto affixed.

Attest: Julia Bartlett Freeborn, Secretary. Frank C. Emerson

Community Club Sprinkler System

Permit 22594.0D
Priority Date: 5/26/1965
Source: North Platte River

NOTE: "DO NOT FOLD THIS FORM. — ONLY FORMS COMPLETED WITH TYPEWRITER OR NEATLY LETTERED WITH WATERPROOF INK WILL BE ACCEPTED."

Form A-1 Temp. Filing No. 19 6/286

PERMIT NO 22594 D 12 NAME OF FACILITY Community Club Sprinkler System

APPLICATION FOR A PERMIT TO DIVERT AND APPROPRIATE THE WATER OF THE STATE OF WYOMING

WATER DIVISION NO. 1 DISTRICT NO. 15

I, John A. Lambert

of Douglas, County of Converse,

State of Wyoming, being duly sworn according to law, upon my oath say:

1. The name of the applicant City ~~Town~~ of Douglas

2. The postoffice address of the applicant Douglas, Wyoming

3. The use to which the water is to be applied is ~~Irrigation~~ Recreation

4. The name of the ditch, canal, pipe line or other facility is Community Club Sprinkler System

5. The source of the proposed appropriation is

, which is a tributary of North Platte River

6. The point of diversion of the proposed works is located S 80 deg. 50 min. W- 1373 feet distant from the N 1/16 corner between Section 20 &21 T. 32 N., R. 71 W., and is in the SW¼NE¼ of Section 20 T. 32 N., R. 71 W.

7. The said ditch, canal, pipe line or other facility is to be 0.975 miles long.

8. (a) The carrying capacity of the ditch, canal, pipe line or other facility at the point of diversion is 0.668 cu. ft. per sec.

(b) If pipe line, size of pipe 6 inches.

9. (a) The nature of the material to be moved is

(b) Number, length and size of tunnels None

(c) Number, length and size of flumes None

10. The estimated cost of said work is $ 35,000.00 Dollars.

11. Construction work will begin within one year from date of approval of this application.

12. The time required for completion of the works is one year from December 31st, 19 65.

13. The time required to complete the application of water to the beneficial uses stated in this application is two years from December 31st, 19 65.

14. The accompanying map is prepared in accordance with the Manual of Regulations and Instructions for Filing Applications in the State Engineer's Office and is hereby declared a part of this application.

15. The land to be irrigated is described in the following tabulation:
(Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Government, State or Private. If Private, give names of owners.)

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			Lands owned by Town of Douglas																
32N	71W	21	40.7	35.4	1.0	6.3	3.8												87.2

Total Number of Acres to be Irrigated 87.2

(Signed) John A. Lambert

THE STATE OF WYOMING,
County of Converse } ss.

I hereby certify that the foregoing application was signed in my presence and sworn to before me by John A. Lambert this 24th day of May, 1965.

My Commission Expires July 9, 1966

Pearl J. Eatherne
Notary Public.

REMARKS

Water is pumped from the North Platte River to a small regulatory reservoir and then into the sprinkler system. The regulatory reservoir is divided into two cells to keep mossfrom the river from getting into the sprinkler system. The pump at the river will operate continuously and the sprinkler system will operate periodically.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } ss.

This instrument was received and filed for record on the 26th day of May, A. D. 19 65, at 9:00 o'clock A. M.

Floyd A. Bishop
Floyd A. Bishop, State Engineer.

Recorded in Book 77 of Applications, on Page 78.

Fee Paid $ 2.00. Map filed D.

~~THE STATE OF WYOMING, }~~
STATE ENGINEER'S OFFICE } ss.

THIS IS TO CERTIFY that I have examined the foregoing application and have rejected same for the following reason: _____

Witness my hand this _____ day of _____, A. D. 19____.

_____,
~~State Engineer.~~

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } ss.

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

This permit is issued subject to the limitation of diversion from North Platte River above Guernsey Reservoir, and from tributaries entering this river above Pathfinder Dam, for the irrigation of more than a total of 168,000 acres of land in Wyoming during any one irrigation season, and of storing more than a total of 18,000 acre-feet of water for irrigation purposes from the North Platte River and its tributaries above Pathfinder Reservoir in Wyoming, between October 1 of any year and September 30 of the following year, as such limitation is imposed by decree of U. S. Supreme Court, entered October 8, 1945, in the North Platte River interstate litigation.

Construction of proposed work shall begin within one year from the date of approval.

The time for completing the work shall terminate on December 31, 19 67.

The time for completing the application of water to beneficial use shall terminate on December 31, 19 67, and final proof of appropriation shall be made within five years thereafter.

The amount of appropriation shall be limited to one cubic foot per second of time for each seventy acres of land reclaimed on or before December 31, 19 67, except as provided in Section 41-184, Wyoming Statutes, 1957, ~~and the additional volume used for purposes on or before said date.~~

Witness my hand this 30th day of December, A. D. 19 65.

Floyd A. Bishop
Floyd A. Bishop, State Engineer.

Permit No. 22594

Page No. 78

PERMIT NO. 22594

PERMIT STATUS

Priority Date May 26, 1965 Approval Date December 30, 1965

May 6, 1965 - Notice of commencement June 5, 1965, received
May 6, 1965 - Notice of completion July 8, 1965, received
May 6, 1965 - Notice of completion of beneficial use July 20, 1965, received

Cert. Record 70 P. 85 Ac. 87.2 Irr.

SCANNED MAR 03 2015

November 24, 2015 Beneficial Use has changed from irrigation to recreation. See Board of Control Records, Certificate Record No. 86, Page 54; Order 64, Page 423.

NOTICE

A Manual of Regulations and Instructions for Filing Applications will be furnished by the State Engineer's Office upon request. By carefully complying with the instructions contained in the Manual, much trouble and delay will be saved the applicant, the surveyor, and the State Engineer's Office.

This application must be accompanied by maps in duplicate, prepared in accordance with the Manual, and by a filing fee of two dollars.

Applications returned for corrections must be resubmitted to the State Engineer within ninety days with the corrections properly made; otherwise the filing will be canceled.

This application when approved does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within one year from the date of approval of this application.

Notice of commencement of work, completion of the work, and of application of the water to the beneficial uses described in the permit, should be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

To perfect your water right, notify your Division Superintendent that you are ready to submit final proof. This notice should be sent to the Superintendent as soon as possible after you apply the water to the beneficial uses described in your permit. When you have submitted your proof before the Superintendent it will be considered by the State Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Appropriation which will constitute a completed water right.

The granting of a permit does not constitute the granting of right of way. If any right of way is necessary in connection with this application it should be understood that this responsibility is the applicant's.

Community Club Sprinkler System

Permit 22594.0D
Certificate of Appropriation

THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 29883
Certificate Record No. 86 Page 54
Water Division No. 1 , District No. 15-5

WHEREAS, City of Douglas has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from North Platte River through the Community Club Sprinkler System under Permit No. 22594 ; ----------for recreation herein described, lying and being in Converse County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made on November 11, 2003 and entered on December 14, 2007 , in Order Record 64 Page 423 , determined and established the priority and amount of such appropriation as follows:

Name and Address of Appropriator(s) City of Douglas, P.O. Box 1030, Douglas, WY 82633

; Date of Appropriation (Priority) May 26, 1965 ; Amount of Appropriation ----------1.24 cu. ft. per sec.;

Total Acreage None ; Head Gate SW¼NE¼ Section 20, T32N, R71W

DESCRIPTION OF LAND FOR WHICH THIS APPROPRIATION IS DETERMINED AND ESTABLISHED

TWP	RANGE	SEC	NE ¼				NW ¼				SW ¼				SE ¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			Water is to be used for recreational purposes at the following described area of use:																
32N	71W	21	X	X	X	X	X												

The right to water hereby confirmed and established is limited to ----------recreation and the use is restricted to the place where acquired and to the purpose for which acquired.

IN TESTIMONY WHEREOF, I, Patrick T. Tyrrell President of the State Board of Control, have hereunto set my hand this 14th day of December , A.D. 2007 , and caused the seal of said Board to be hereunto affixed.

Attest: Allan Cunningham Ex-officio Secretary

Patrick T. Tyrrell President.

First Enlargement of Community Club Sprinkler System

Permit 6471.0E
Priority Date: 5/10/1973
Source: North Platte River

MICRO-FILMED OCT 29'73

NOTE: "DO NOT FOLD THIS FORM. — ONLY FORMS COMPLETED WITH TYPEWRITER OR NEATLY LETTERED WITH WATERPROOF INK WILL BE ACCEPTED."

P. H. Thompson

Form B-1

Temp. Filing No. 21 5/223

PERMIT NO. 6471, ENLARGEMENT
E-16

APPLICATION FOR A PERMIT TO DIVERT AND APPROPRIATE THE WATER OF THE STATE OF WYOMING

WATER DIVISION NO. 1 **DISTRICT NO.** 14

ENLARGEMENT OF THE Community Club Sprinkler System

I, John A. Lambert of Douglas, County of Converse, State of Wyoming, being duly sworn according to law, upon my oath say:

1. The name of the applicant The Town of Douglas, Wyoming

2. The postoffice address of the applicant 130 South Third Street, Douglas, Wyoming 82633

3. The use to which the water is to be applied is ~~--Irrigation--~~ Recreation (watering of golf course)

4. The name of the Enlargement is First Enlargement Community Club Sprinkler System

5. The source of the proposed appropriation is North Platte River

which is a tributary of ~~North Platte River~~

6. (a) The headgate of the ditch to be enlarged is located S 80 deg. 50 min. W. -1373 feet feet distant from the N 1/16 between ~~corner~~ Sections 20 & 21 of Section T. 32 N., R. 71 W., and is in the SW¼NE¼ of Section 20 T. 32 N., R. 71 W. Resurvey

(b) Said ditch is 0.975 miles long and has a carrying capacity at the headgate of 0.67 cubic feet per second.

(c) The total area now irrigated from said ditch is ~~92.2~~ 87.2 acres, being lands described in Permit No. ~~6101 and temp. filing No. 19-6/286~~ 22594

7. The proposed diversion and appropriation of water is to be made by means of:
(a) The enlargement of the ditch, without extension? ---
(b) The enlargement and extension of the ditch? Extension of pipeline
The head of the extension is located S 18 deg. 20 min. E 780 feet distant from the N¼ corner of Section 21 T. 32 N., R. 71 W., and is in the NW¼NE¼ of Section 21 T. 32 N., R. 71 W. Resurvey

8. The said ditch as enlarged will be 1.42 miles long and will have a carrying capacity at the headgate of 1.29 cubic feet per second.

9. (a) The nature of the material to be moved is sandy Loam
(b) Number, length and size of tunnels None
(c) Number, length and size of flumes None

10. The estimated cost of said enlargement is $ 100,000.00 Dollars.

11. Construction on proposed work will begin within one year from date of approval of this application.

12. The time required to complete the enlargement is two years from December 31st, 19 73.

13. The time required to complete the application of water to the beneficial uses stated in this application is three years from December 31st, 19 73.

14. The accompanying map is prepared in accordance with the Manual of Regulations and Instructions for Filing applications in the State Engineer's Office and is hereby declared a part of this application.

15. The land to be irrigated by this enlargement is described in the following tabulation: (Give Irrigable Acreage in Each 40-Acre Subdivision. Designate Ownership of Land, Government, State or Private. If Private, Give Names of Owners.)

Township	Range	Sec.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
							Land owned by Town of Douglas, Wyoming												
32N	71W	22					26	29.4											55.4
							FOR RECREATION PURPOSES (watering of golf course located,												
							partially, in the avobe described lands).												

Total Acreage Under This Enlargement 55.4

(Signed) John A. Lambert

THE STATE OF WYOMING,
County of Converse } ss.

I hereby certify that the foregoing application was signed in my presence and sworn to before me by John A. Lambert this 9th day of May, 1973.

GEORGIA M. GRAVES - Notary Public
County of Converse State of Wyoming
My Commission expires March 21, 1975

My Commission Expires March 21, 1975 Georgia M. Graves
Notary Public.

REMARKS

Water is to be pumped from the North Platte River to two settling ponds. From the ponds it is pumped into sprinkler systems for the irrigation of lands at the Douglas Community Club.

CONSENT TO ENLARGE

The Town of Douglas is the sole owner of the Community Club Sprinkler System

the sole owner of the _____ Ditch,
taking water from _____ under Permit No. _____,
for and in consideration of _____,
do hereby give _____ free and voluntary consent to the enlargement or extension of, and to the use of water through, the said ditch, for the irrigation of _____ acres, by _____, according to the terms of his application for enlargement.

Dated May 9, 1973, 19____.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } ss.

This instrument was received and filed for record on the 10 day of May, A. D. 1973, at 9:00 o'clock A. M.

James H. Aduddell
James H. Aduddell, Asst. State Engineer.

Recorded in Book 26 of Enlargements, on Page 59.

Fee Paid $ 2.00. Map filed E.

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } ss.

THIS IS TO CERTIFY that I have examined the foregoing application and have rejected same for the following reason:

Witness my hand this day of, A. D. 19.

State Engineer.

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } ss.

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

The time allowed for commencing construction under this permit shall expire on Dec. 31, 1975.

~~Construction of proposed work shall begin not later than the date of approval~~

The time for completing the work shall terminate on December 31, 1976.

The time for completing the application of water to beneficial use shall terminate on December 31, 1976, and final proof of appropriation shall be made within five years thereafter.

~~The amount of appropriation shall be limited to such rate per second of time for each acre of land or other unit of measurement as may be determined reasonable and beneficial use and shall not exceed the rate per second of time specified herein. Failure to make reasonable and beneficial use of water during any period of five consecutive years after it has been applied to the land shall be prima facie evidence of abandonment as provided in Section 41-3-401, Wyoming Statutes 1957, and the right to the use of the water involved shall be subject to forfeiture.~~

Witness my hand this 20th day of Oct., A. D. 1973.

Floyd A. Bishop
Floyd A. Bishop, State Engineer.

Permit No. 6471 ENL.

Page No. 58

PERMIT NO. 6471 ENL.
E-16

PERMIT STATUS

Priority Date May 10, 1973 Approval Date October 20, 1973

September 30, 1975 - Notice of expiration of time for commencement mailed. SEP 24 '75

October 14, 1975 - Notice of Commencement of Work, June 1, 1973 received. OCT 22 '75

September 30, 1976 - Notice of expiration of time for completion of construction and completion of beneficial use mailed. SEP 22 '76

October 5, 1976 - Notice of Completion of Construction, October 4, 1976 received.

October 5, 1976 - Notice of Completion of Beneficial Use, October 4, 1976 received. OCT 13 '76

CERT. RECORD 72 P. 442 AC. 0.67 c.f.s

PROOF NO. 32044 RECREATION MICRO. FILMED MAY 24 '78

SCANNED MAY 26 2015

NOTICE

An application for permit providing for the appropriation of more water, or for the additional use of water through the point of diversion of an existing ditch, must be filed on this form. Where a portion of an existing ditch is to be used, but the water is to be diverted at a different headgate, an application form for an original permit should be used.

A Manual of Regulations and Instructions for Filing Applications will be furnished by the State Engineer's Office upon request. By carefully complying with the instructions contained in the Manual, much trouble and delay will be saved the applicant, the surveyor, and the State Engineer's Office.

This application must be accompanied by maps in duplicate, prepared in accordance with the Manual, and by a filing fee of two dollars.

Applications returned for corrections must be resubmitted to the State Engineer within ninety days with the corrections properly made; otherwise the filing will be canceled.

This application when approved does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within one year from the date of approval of this application.

Notice of commencement of work, completion of the work, and of application of the water to the beneficial uses described in the permit, should be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

To perfect your water right, notify your Division Superintendent that you are ready to submit final proof. This notice should be sent to the Superintendent as soon as possible after you apply the water to the beneficial uses described in your permit. When you have submitted your proof before the Superintendent it will be considered by the State Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Appropriation which will constitute a completed water right.

The granting of a permit does not constitute the granting of right of way. If any right of way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

First Enlargement of Community Club Sprinkler System

Permit 6471.0E
Certificate of Appropriation

THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 32044
Certificate Record No. 72, Page 442
Water Division No. 1, District No. 14

WHEREAS, The Town of Douglas has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from North Platte River through the Enl. Community Club Sprinkler System under Permit No. 6471 Enl. Recreation purposes for irrigation of the lands herein described, lying and being in Converse County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made and entered on the 16th day of December, A. D. 19 77, in Order Record No. 21, Page ~~472~~ 471, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator The Town of Douglas; Postoffice Address 130 South Third Street, Douglas, 82633, Wyoming;
Date of Appropriation May 10, 1973; Total Acreage Fifty-Five and Four Tenths (55.4) Acres;
Amount of Appropriation 0.67 cu. ft. per sec.; Description of land to be irrigated and for which this appropriation is determined and established:

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			This appropriation is limited to 0.67 cubic feet per second for the watering of lawn																
			at the Douglas Community Club golf course, at the following points of use:																
32N	71W	22					26	29.4											55.4

Head Gate: SW¼NE¼ 20-32-71

The right to water hereby confirmed and established is limited to irrigation recreation purposes and the use is restricted to the place where acquired and to the purpose for which acquired; rights for irrigation not to exceed one cubic foot of water per second for each seventy acres of land for which the appropriation is herein determined and established, except when there is surplus water in the stream as provided by Sections 41-181 to 41-189, Wyoming Statutes, 1957.

IN TESTIMONY WHEREOF, I, GEORGE L. CHRISTOPULOS, President of the State Board of Control, have hereunto set my hand this 16th day of December, A. D. 19 77, and caused the seal of said Board to be hereunto affixed.

Attest: William Long Ex-officio Secretary.

George L. Christopulos President.

THE MILLS COMPANY, SHERIDAN 134161

Permits 22594.0D and 6471.0E
Change of Use Order

Changes Use from irrigation to recreational

MINUTE RECORD BOOK 27, PAGE 334

NO MAP REQUIRED

IN THE MATTER OF THE PETITION FOR AN AMENDED CERTIFICATE OF APPROPRIATION FOR THE TOWN OF DOUGLAS APPROPRIATION, PERMIT NO. 22594, DIVERTING FROM THE NORTH PLATTE RIVER THROUGH THE COMMUNITY CLUB SPRINKLER SYSTEM, WITH PRIORITY OF MAY 26, 1965.

DOCKET NUMBER I-2003-4-1
IN WATER DIVISION NUMBER ONE

(O.R. 19, P. 161; C.R. 70, P. 85; PROOF NO. 29883)

PETITIONER: **CITY OF DOUGLAS, ACTING THROUGH ITS MAYOR, SHERRI MULLINNIX, OF P.O. BOX 1030, DOUGLAS, COUNTY OF CONVERSE, STATE OF WYOMING.**

This matter was considered by the State Board of Control at its regular meeting on November 11, 2003, with the following results:

FINDINGS OF FACT

1. THAT the petitioner is the owner of the appropriation involved as evidenced by the records of the State Board of Control.

2. THAT the appropriation involved is the Town of Douglas Appropriation, Permit No. 22594, adjudicated under Proof No. 29883, in the amount of 1.24 c.f.s. for the irrigation of 87.2 acres, diverting from the North Platte River through the Community Club Sprinkler System, with priority of May 26, 1965, and of record in Order Record 19, page 161; Certificate Record 70, page 85 describing the lands irrigated as follows:

Township 32 North, Range 71 West		
Section 21:	NE¼NE¼	40.7 acres
	NW¼NE¼	35.4
	SW¼NE¼	1.0
	SE¼NE¼	6.3
	NE¼NW¼	3.8
Total		87.2 acres (1.24 c.f.s.)

3. THAT by and through its petition, the petitioner requested that the certificate of appropriation for the Town of Douglas Appropriation, Permit No. 22594, Proof No. 29883, be amended by replacing the designated irrigation use with recreation use.

4. THAT the reason for this amendment is the petitioner desires to better describe the actual historic use of the water, and be consistent with the use permitted under the Enlarged Community Club Sprinkler System, Permit No. 6471 Enl., which is for recreational purposes. The water under the Town of Douglas Appropriation, Permit No. 22594, Proof No. 29883, has been historically used for the watering of golf course fairways, greens and surrounding areas of trees and landscaping.

5. THAT the granting of this petition will not injure any other appropriators.

CONCLUSIONS OF LAW

The State Board of Control has jurisdiction both to consider the petitioner's request for an amended certificate of appropriation and to prepare and promulgate the Order hereinafter set forth disposing of said petition.

The Findings of Fact contain the elements necessary to comply with Section 41-4-514, W.S. 1977, pertaining to an amended certificate of appropriation and the petition should be granted.

ORDER

IT IS HEREBY ORDERED THAT this petition be and the same is **GRANTED** without loss of priority and subject to the condition that the changes shall not affect the rights of other appropriators in good standing at the time the changes are made.

IT IS FURTHER ORDERED THAT an amended certificate of appropriation be issued to the petitioner as follows:

NORTH PLATTE RIVER

Certificate Record Book	Certificate Record Page	Proof No.	Permit No.	Name of Facility	Name of Appropriator	Address	Date of Appro.	Use For Which Appro.	Amt. of Appro. C.F.S.	No. of Acres
86	54	29883	22594	Community Club Sprinkler System H.G: SW¼NE¼ Section 20-32-71	City of Douglas	P.O. Box 1030 Douglas, WY 82633	May 26, 1965	Recreation	1.24	None

Description of Lands: Water is to be used for recreational purposes at the following described area of use:
Township 32 North, Range 71 West
Section 21: NE¼
NE¼NW¼

DONE AT CHEYENNE, COUNTY OF LARAMIE, STATE OF WYOMING THIS 11TH DAY OF NOVEMBER 2003.

STATE BOARD OF CONTROL

Patrick T. Tyrrell

PATRICK T. TYRRELL, PRESIDENT

ATTEST:

Allan Cunningham

ALLAN CUNNINGHAM, EX-OFFICIO SECRETARY

ENTERED: December 14, 2007

Douglas Water Treatment Plant Reservoir

Permit 12963.0R
Priority Date: 7/2/2007
No Appropriation

Form S.W. 3
Rev. 6/2/2006

07-02-07 RC 850

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

SCANNED AUG 23 2007

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

cwright

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the 2nd day of July, 2007, at ~~10:46~~ 8:50 o'clock ___ AM.

John R. Barnes, for State Engineer

Recorded in Book 67 of Reservoir Permits, on Page 13

Fee Paid $ 25 Map Filed E

WATER DIVISION NO. 1 DISTRICT NO. 14 TEMPORARY FILING NO. 34 4/71

PERMIT NO. 12963 RESERVOIR

E-28

NAME OF FACILITY

THE Douglas Water Treatment Plant ~~Improvements~~ RESERVOIR

1. Name(s), mailing address and phone no. of applicant(s) is/are City of Douglas Attn: Les Newton, 420 W. Grant Street, Douglas, Wy 82633 cw
307-358-9750
E-mail address: lnewton@cityofdouglas.org
(if more than one applicant, designate one to act as Agent for the others)

2. Name & address of agent to receive correspondence and notices Ashley Currey, 9193 S. Jamaica Street Englewood, CO. 80112
E-mail address: Ashley.Currey@ch2m.com

3. The use to which the water is to be applied is ~~Potable Water Supply for Douglas, WY.~~ Industrial (Sediment control) cw
(a) If more than one beneficial use of water is applied for, the reservoir capacity must be allocated in acre-feet to the various uses:

Active Capacity	Inactive Capacity
6.28 industrial (sediment control)	0 cw

(b) The area of the high water line of the reservoir is 1.06 acres.
(c) The total available capacity of the reservoir is ~~6.14~~ 6.28 * acre-feet. *Calculation Error
(d) If enlargement, the capacity of this enlargement is N/A acre-feet.

4. The source of the proposed appropriation is ~~via an existing diversion intake from the~~ In the drainage of N. Platte River. SEE REMARKS cw

5. The outlet of the proposed reservoir is located 1,440 feet distant from the NE corner of Section 8 T. 32 N., R. 71 W., and is in the NW 1/4 NE 1/4 of Section 8 T. 32 N., R. 71 W.
Lot ___ Block ___ Subdivision Name ___ cw
Latitude (Decimal Degrees) 42 45'56.52" N Longitude (Decimal Degrees) 105 23'35.32" W

6. Are any of the lands covered by the proposed reservoir owned by the State or Federal government? If so, describe lands and designate whether State or Federally owned. NA cw

7. Fill out for either (a) or (b):
(a) The reservoir is located in the ~~channel of~~ Drainage of North Platte River
(b) The reservoir is to be filled through the existing water plant intake pipe from the N. Platte River. Canal which has a carrying capacity of 3.09 cubic feet per second (c.f.s.) See remarks cw

8. (a) The dam is to be constructed as follows: Placement of earthfill containment berms around mostly fill and a small amount of cut.
contents = 21,595 (net fill) cubic yards.
(b) The water face of the dam is to be protected from wave action in the following manner: Vegetative Cover
(c) The dam height, as measured by the dam crest elevation minus the lowest downstream toe elevation is 9.1 feet.

9. The estimated time required for completion of construction is Four Months.

10. The accompanying map is prepared in accordance with the State Engineer's Rules and Regulations for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

REMARKS

No appropriation granted under this permit. Appropriation is under the following permits:

6101	for ~~1.33~~ 1.23CFS 2011	Municipal Use*
9903	for 4.50CFS	Municipal Use
Total:	5.73CFS	

*This water may only be diverted for municipal use during the historical irrigation season May 1st through September 30th and is not to exceed 263.52 ac-ft per year

NOTICE

A copy of the Rules and Regulations manual for filing applications will be furnished by the State Engineer's Office upon request.

This application (on 24 lb., 25% cotton bond paper, top-bound) must be accompanied by the required map, prepared in accordance with the instructions contained in the manual and by the required filing fee. All applications and maps are reviewed by the State Engineer's Office to assure compliance with both the Rules and Regulations by the applicant, the professional engineer or land surveyor.

This application is not your authority to begin construction work. You can commence work only after a permit is approved by the State Engineer.

NOTE: If construction under this application is for enlargement of an existing reservoir, the following consent to this enlargement must be completed.

CONSENT TO ENLARGE

_____,

the sole owner__ of the _____ Reservoir, storing water from _____, under Permit No. _____ Res.,

for and in consideration of _____ do hereby give _____
(name of applicant[s])

my/our free and voluntary consent to the enlargement of said reservoir of this application for enlargement.

Signature	Printed Name	Date	Acre/Feet Owned

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

Ashley Cramer
Signature of Applicant or Agent

06/29/07
Date

THE STATE OF WYOMING }
STATE ENGINEER'S OFFICE } ss.

TEMPORARY FILING NO. 34 4/71

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

The total capacity of this Industrial (sediment control) reservoir is 6.28 acre-feet for which no appropriation is granted. This reservoir consists of two cells temporarily storing water provided under the following Town of Douglas municipal water rights:

Permit No. 6101* and 9903

*Note: Permit No. 6101 can only be diverted during the historical irrigation period of May 1st through September 30th.

The applicant has requested waiver of the five-foot freeboard requirement and such waiver is granted by the State Engineer's endorsement hereon. However, such waiver does not relieve the appropriator of responsibility for safety of operation of the reservoir or of liability in case of failure of the dam.

This permit is issued subject to the terms of the Platte River Recovery Implementation Program (PRRIP) of January 1, 2007. No mitigation is necessary at this time as the depletions are being covered by the state of Wyoming.

The municipal water use of the City of Douglas is covered under the PRRIP as an existing water related activity of municipal use under Baseline No. 2 in Wyoming's Depletions Plan of January 1, 2007. An annual report of total municipal water use shall be submitted to this office addressed to the State Coordinator of Wyoming's Depletions Plan. The report shall include monthly diversions of surface water and groundwater and the resulting measurable effluent (return flow), if any. The report shall be completed for each water year (October 1 through September 30) and be submitted no later than December 1 of each year.

The time for completing the construction of the reservoir shall terminate on December 31, 20 10.

Witness my hand this 22nd day of AUGUST, A.D. 2007.

FOR John R. Garner
PATRICK T. TYRRELL, State Engineer

Permit No. 12963 Res.

Page No. 13
(Leave Blank)

PERMIT NO. 12963 RES.

E-28

PERMIT STATUS

Priority Date **July 2, 2007** Approval Date **August 22, 2007**

September 8, 2010 Notice of expiration of time for completion of construction mailed.

September 30, 2010 Notice of Completion of Construction on **August 15, 2008,** received from Applicant.

PROOF PREPARED
ADJUDICATION IN PROCESS

SCANNED SEP 30 2010

CERT. REC. R20, P. 54 PROOF NO. 40608
IRR. ____ STK. ____ DOM. ____ MISC. IND
AC. _____ C.F.S. 0.00 gf

NOTICE

This permit does not constitute a complete water right. It is your authority to begin construction work.

Notice of completion of the work described in the permit, must be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

Once the Notice of Completion has been filed, Proof of Appropriation will be prepared and sent to your Water Division Superintendent. The Superintendent will arrange with you for an inspection of the facility. Should you desire adjudication, the Proof will be considered by the Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Construction which will constitute a completed water right.

The granting of a permit does not constitute the granting of right-of-way. If any right-of-way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

Douglas Water Treatment Plant Reservoir

Permit 12963.0R
Certificate of Reservoir Construction

THE STATE OF WYOMING

Certificate of Construction of Reservoir

Proof No. 40608
Certificate Record No. R-20 Page 54
Water Division No. 1 , District No. 14

WHEREAS, City of Douglas has presented to the Board of Control of the State of Wyoming, proof of construction of the Douglas Water Treatment Plant Reservoir, Permit No. 12963 Res., located in NE¼NE¼; NW¼NE¼ Section 8 , T. 32 N., R. 71 W., Converse County, Wyoming; Outlet: NW¼NE¼, Section 8, T32N, R71W

Whereas, the proof of construction sets forth that said reservoir has been completed in accordance with the terms of said permit to a capacity sufficient to impound 0.0---- acre-feet of water; and that the source of the quantity of water authorized to be stored in the Douglas Water Treatment Plant Reservoir is obtained from North Platte River via Douglas Canal, Permit No. 6101 and Town of Douglas Pipeline, Permit No. 9903

NOTE: This reservoir is located in the drainage of North Platte River

NOW KNOW YE, That the State of Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made on August 19, 2011 and entered on March 30, 2012 , in Order Record 81 Page 300 , determined and established the priority and amount of such appropriation as follows:

Name of Owner City of Douglas ; Address 420 W. Grant Street, Douglas, WY 82633 ;

Date of Priority July 2, 2007 ; Total available storage capacity in the Douglas Water Treatment Plant Reservoir, as constructed under provisions of Permit No. 12963 Res., is 0.0---- acre-feet. * This appropriation is for sediment control for which no appropriation is granted. This appropriation is subject to the terms of the Platte River Recovery Implementation Program.

The right to store water is limited to such an amount as shall be beneficially used, not to exceed one filling annually of said reservoir, for industrial purposes----------

---

IN TESTIMONY WHEREOF, I, Patrick T. Tyrrell President of the State Board of Control, have hereunto set my hand this 30th day of March , A.D. 2012 , and caused the seal of said Board to be hereunto affixed.

ATTEST:

Allan Cunningham
Ex-officio Secretary

Patrick T. Tyrrell
President

Douglas Water Treatment Plant Water Haul (Temporary)

Permit 36881.0D
Priority Date: 4/14/2023
Expires 5/2/2025
Source: North Platte River

Form S.W. 1
Rev.07/14/2021

ck #90557
$50.00

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

RCVD 4-14-2023 10:00AM

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

J. McNulty

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the 14th day of April, 20 23, at 10:00 o'clock A. M.

For State Engineer

Recorded in Book _____ of Ditch Permits, on Page _____

Fee Paid $ 50.00 Map Filed _____

WATER DIVISION NO. 1 DISTRICT NO. 14 COUNTY(IES) Converse

TEMPORARY FILING NO. 37 6/385D PERMIT NO. 36881

NAME OF FACILITY Douglas WTP Water Haul

1. Name(s), mailing address and phone no. of applicant(s) is/are City of Douglas, PO Box 1030 Douglas WY, 82633 (307) 358-3462

E-mail address: joberlander@cityofdouglas.org
(if more than one applicant, designate one to act as Agent for the others)

2. Name & address of agent to receive correspondence and notices Joshua M. Oberlander, City of Douglas PO Box 1030 Douglas, WY 82633

E-mail address: joberlander@cityofdouglas.org

3.(a) The use to which the water is to be applied is Temporary-Industrial Use (Oil & Gas Development) J.M.

(b) If more than one beneficial use of water is applied for, the location and ownership of the point of use must be shown in item 10 of the application and the details of the facilities used to divert and convey the appropriation must be shown on the map in sufficient detail to allow the State Engineer to establish the amount of appropriation. In multiple use applications, stock and domestic purposes are limited to 0.056 cubic feet per second.

4. The source of the proposed appropriation is North Platte River, tributary of Platte River, tributary of Missouri River

5. The point of diversion of the proposed works is located _____ feet distant from the _____ corner of Section _____ T. _____ N., R. _____ W., and is in the NW 1/4, NE 1/4 of Section 8 T. 032N N., R. 071W W.
Lot _____ Block _____ Subdivision Name _____ Orig. Survey
Latitude 42.76375 Longitude -105.393667

6. Are any of the lands crossed by the proposed facility owned by the State or Federal government? If so, describe lands and indicate whether State or Federally owned.
N/A

7. The carrying capacity of the ditch, canal, pipeline or other facility at the point of diversion is 1.11 cubic feet per second (c.f.s.)

8. The accompanying map is prepared in accordance with the State Engineer's Rules and Regulations for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

9. The estimated time required for the completion of construction is two years, and to complete the application of water to the beneficial uses stated in this application is two years.

Permit No. 36881

Page No. _____ (Leave Blank)

10. The land to be irrigated under this permit is described in the following tabulation. (Give irrigable acreage in each 40-acre subdivision. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

Town-	Range	Sec.	NE¼				NW¼				SW¼				SE¼				
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
Resurvey			A	r	e	a		o	f		u	s	e		i	s			
			e	n	t	i	r	e	t	y		o	f						
			c	o	n	v	e	r	s	e		c	o	u	n	t	y	,	
			s	e	e		p	e	r	m	i	t		m	a	p			
			The amount of appropriation shall be limited to the amount of water used for temporary (industrial) purposes only, not to exceed the diversion rate from the North Platte River of 1.11 CFS (500 GPM), or 720,000 gallons per day, or a total of 52,520,000 gallons during the twenty-four (24) month period).																

Number of acres to receive original supply	0.00
Number of acres to receive supplemental supply	0.00
Total number of acres to be irrigated	0.00

REMARKS

The City of Douglas is requesting a permit for water haul activities across Converse County for industrial purposes using water from the North Platte River. The point of diversion is an existing 3-inch load out facility located at the Public Works shop. The maximum instantanious rate is 1.11 CFS (500 GPM), the annual maximum is 26,260,000 gallons or 52,520,000 gallons in the two years from ~~any one or all three sources.~~ the North Platte River J.M.

Water will be used for Industrial Purposes: Energy Development - Drilling, Stimulation, and Incidental Well Site Construction

I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

By providing an email address you agree to receive communications and notices electronically

J.D. Cox, City Administrator
Printed Name and Signature of Applicant or Agent

Date

THE STATE OF WYOMING
STATE ENGINEER'S OFFICE } **ss.**

TEMPORARY FILING NO. 37 6/385D

THIS IS TO CERTIFY that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This permit grants only the right to use the water available in the stream after all prior rights are satisfied.

This permit is issued with the condition that the permittee shall notify the District Water Commissioner prior to diverting water.

This permit is conditioned on the holder of this permit securing and/or providing free and unencumbered access to this facility site to allow State Engineer personnel to perform their duties as prescribed by Law. These duties include, but are not limited to, construction inspections and water administration.

This permit will be automatically cancelled on 05/04/2025.

No final proof of appropriation to be accepted under this permit.

The notices of completion and of beneficial use are waived and will not be required because of the temporary nature of this appropriation.

Platte River Recovery Implementation Program.

This permit is issued subject to all limitations imposed by the Platte River Recovery Implementation Program (PRRIP) of January 1, 2007. This permit was reviewed by the PRRIP Coordinator. It is determined that the depletions associated with the water hauling are covered by the State of Wyoming due to the temporary status of this activity. No mitigation is currently necessary. However, if this facility is found to have depletive effects in accordance with Wyoming's Depletions Plan, the permit holder may be required to mitigate depletions from this activity at a future date.

The permit holder shall install a suitable measuring device at the point of diversion. The measuring device must be preapproved by the State Engineer or his designee. The permit holder shall keep daily records of all water diverted under this permit. On forms provided by the State Engineer's Office, during the term of this permit the permit holder shall submit the total amount of water diverted under the permit during the previous month by regular or electronic mail to the State Engineer's Office, Herschler Building, 2W, Cheyenne, WY 82002, Phone: 307-777-6475, Email: sandra.lorentz@wyo.gov no later than the 10th day of each month, whether water is diverted or not. The permit holder's failure to submit records as required may result in denial of use of water under this permit. The State Engineer's Office may use the records as necessary for water administration, water accounting purposes, and/or to determine depletive effects.

~~The time for completing the construction work shall terminate on December 31, 20_____.~~
~~The time for completing the application of water to beneficial use shall terminate on December 31, 20_____, and final proof of appropriation shall be made within 5 years thereafter.~~

Witness my hand this 4th day of May, A.D. 2023.

For: BRANDON GEBHART, P.E., State Engineer

Permit No. 36881

Page No. _____
(Leave Blank)

PERMIT NO. 36881

PERMIT STATUS

Priority Date April 14, 2023 Approval Date May 4, 2023

NOTICE

This permit, does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within the time allowed in the permit.

Notice of completion of the work described in the permit, must be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

Once the Notice of Completion has been filed, Proof of Appropriation will be prepared and sent to your Water Division Superintendent. The Superintendent will arrange with you for an inspection of the facility. Should you desire adjudication, the Proof will be considered by the Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Construction which will constitute a completed water right.

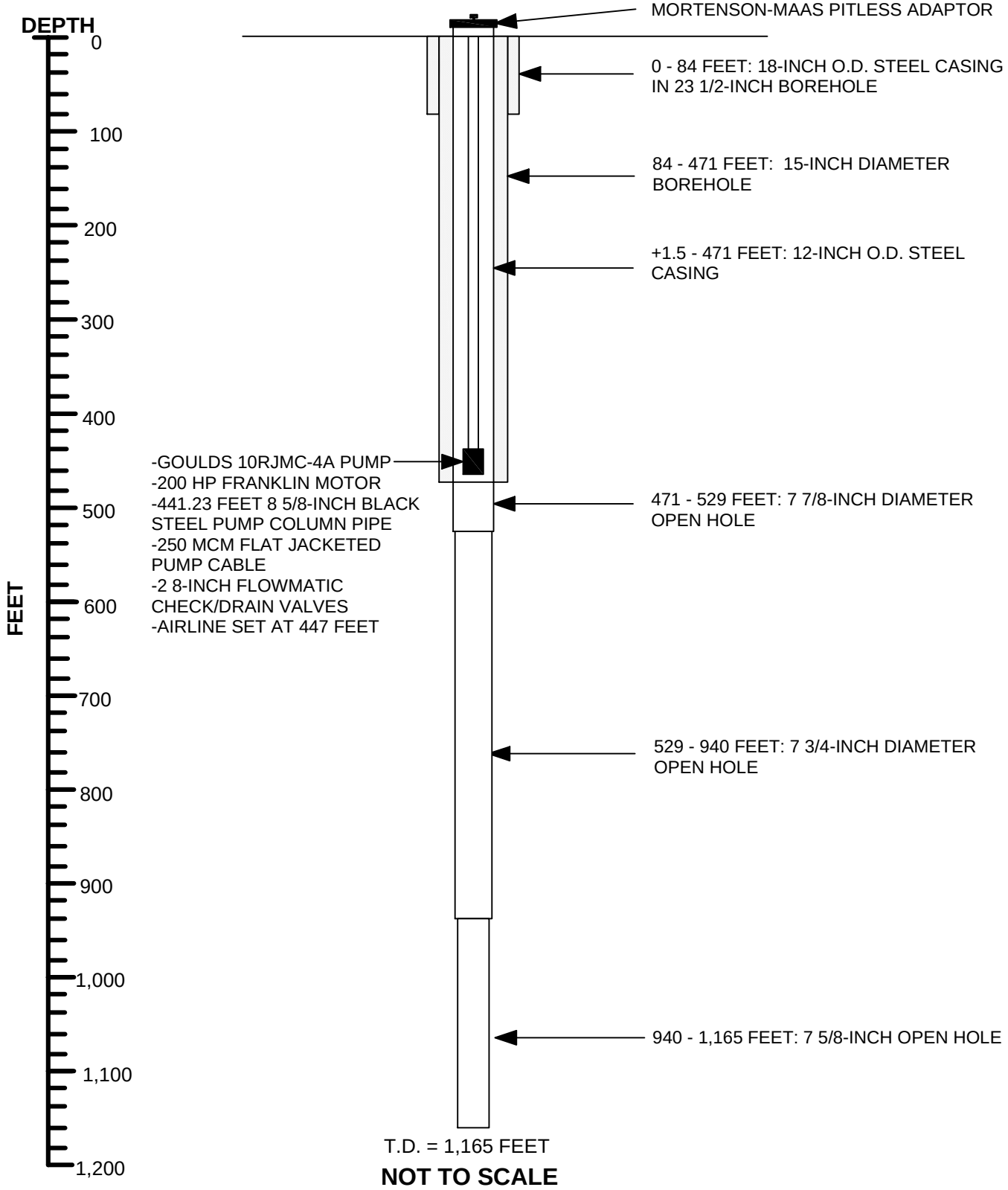
The granting of a permit does not constitute the granting of right-of-way. If any right-of-way is necessary in connection with the application it should be understood that this responsibility is the applicant's.

Appendix B- Operations and Maintenance Criteria

Includes the As Built for Sheep Mountain Well No. 1 and O&M for the Douglas Water Treatment Plant

Sheep Mountain Well As Built Diagram (2013)

AS-BUILT DESIGN DETAILS



NOT TO SCALE

WESTON
GROUNDWATER • ENGINEERING

SHEEP MOUNTAIN WELL
AS-BUILT DIAGRAM
AUGUST 2013

Douglas Water Treatment Plant Operations and Maintenance Manual

1.0 Plant Facilities and Design Criteria

Due to expansion of their groundwater supplies and operational considerations, the City did not routinely operate the surface water treatment plant, which was constructed over 25 years ago. Modifications have been made to the existing facility to allow the City to deliver up to 2 million gallons per day (2 mgd) of North Platte River water to their customers. In general, the existing treatment plant has been modified to incorporate presedimentation and slow sand filtration in lieu of the existing conventional treatment processes. Design criteria for the Douglas Water Treatment Plant (WTP) are summarized in **Table 1**.

The major plant facilities include the river intake, influent structure, three low lift pumps, two presedimentation pond cells, filter flow splitting structure, three slow sand filters, three filter outlet structures, chlorine injection, clearwell, and two high service pumps. The river intake and influent structure were existing facilities, as was the clearwell; however, the clearwell was modified to include FRP baffle walls to limit short-circuiting through the clearwell. Two of the three low lift pumps and both high service pumps were replaced. The other facilities were newly constructed as part of the treatment plant improvements.

The water treatment plant is operated seasonally from May to September and designed for a minimum water temperature of 13 degrees Celsius. The general process works as follows. River water is pumped into the two presedimentation pond cells, which are designed to remove turbidity, such as dirt and clay particulates, from the water. The supernatant water from the presedimentation cells flows by gravity through collection piping and is fed into a flow splitting structure, which supplies water to the three slow sand filters. The water flows downward through the filters by gravity. The slow sand filters effectively remove particles and microorganisms by physical and biological action. Water is collected at the bottom of the filters by perforated pipes, and flows by gravity through the filter outlet structure to the clearwell. Chlorine is added between the filters and clearwell, so that the clearwell serves as a chlorine contact basin as well as a pump wet well. Baffles were included in the clearwell to improve the chlorine contact time. The high service pumps then deliver water to the City's distribution system.

TABLE 1
Process Design Criteria Summary

PLANT CAPACITY	
DESIGN FLOW (MGD)	2
TREATMENT REQUIREMENTS	
TOTAL VIRUS REMOVAL/INACTIVATION (LOG)	4.0
TOTAL *GIARDIA* REMOVAL/INACTIVATION (LOG)	3.0
TOTAL *CRYPTOSPORIDIUM* REMOVAL/INACTIVATION (LOG)	3.0
PRESEDIMENTATION POND	
TYPE	EARTHEN
NUMBER OF CELLS	2
VOLUME PER CELL (GAL)	1,000,000
DETENTION TIME (HOURS)	24
SIDE SLOPE	3:1
BOTTOM SLOPE (%)	0.5
SIDE WATER DEPTH (FT)	10
FREEBOARD (FT)	2

TABLE 1
Process Design Criteria Summary

SLOW SAND FILTERS	
TYPE	REINFORCED CONCRETE
NUMBER OF FILTERS	3
FILTER BED AREA	
INDIVIDUAL FILTER AREA (SF)	6,960
TOTAL FILTER AREA (SF)	20,880
LOADING RATE	
3 FILTERS IN SERVICE (GPM/SF)	0.066
2 FILTERS IN SERVICE (GPM/SF)	0.100
SAND	
DEPTH (FT)	3
EFFECTIVE SIZE RANGE (MM)	0.15 TO 0.30
UNIFORMITY COEFFICIENT	MAXIMUM 2.5
GRAVEL DEPTH (FT)	2
TERMINAL HEADLOSS BUILDUP (FT)	4
FREEBOARD (FT)	1
WALL HEIGHT (FT)	13
FILTRATION GOAL	
VIRUS REMOVAL (LOG)	2.0
GIARDIA REMOVAL (LOG)	2.0
CRYPTOSPORIDIUM REMOVAL (LOG)	3.0
CHLORINE SYSTEM	
TYPE	CHLORINE GAS
CONTAINERS	
TYPE	CYLINDERS
NUMBER	7
CAPACITY, EACH (LBS)	150
INJECTORS	
TYPE	IN-LINE
NUMBER	1
LOCATION	FILTER EFFLUENT PIPE
DISINFECTION GOAL	
GIARDIA INACTIVATION (LOG)	1.0
VIRUS INACTIVATION (LOG)	2.0
CLEARWELL	
TYPE	REINFORCED CONCRETE, EXISTING
NUMBER	1
EXISTING BAFFLING TYPE	CONCRETE
NEW BAFFLING TYPE	FIBER REINFORCED PLASTIC
TOTAL VOLUME (GAL)	134,000
USABLE VOLUME (GAL)	107,000
THEORETICAL DETENTION TIME (MIN)	77
MINIMUM TEMPERATURE (°C)	13
MAXIMUM pH	8.5
TARGET CHLORINE RESIDUAL (MG/L)	1.2
CT REQUIRED (MG*MIN/L)	53.8
T10 REQUIRED (MIN)	44.8
HYDRAULIC EFFICIENCY REQUIRED (%)	58
TARGET HYDRAULIC EFFICIENCY (%)	60

2.0 Slow Sand Filtration

2.1 Theory

Slow sand filters have been used to treat or 'purify' water for almost two centuries since the first filter was built in 1804 in Scotland. The first slow sand filter in the United States was built in 1872 for the town of Poughkeepsie, New York. Even following the development of rapid sand filters in 1882, slow sand filters were used extensively both in large cities and small communities for at least one half century. The major advantage of SSF is its reliability in removing microorganisms and turbidity from water without the need for chemical coagulation. However, the relatively large land area requirement and labor intensive sand cleaning operation caused its decline in larger cities, with smaller communities eventually following suit.

A strong renewed interest in SSF developed in the 1980's as a result of waterborne outbreaks caused by *Giardia* cysts. It was found that chlorination alone, even for good quality sources, was inadequate for controlling these organisms. *Giardia* cysts are much more resistant than most organisms to disinfection by chlorination. At about the same time, researchers determined that SSF was very effective in removing *Giardia* cysts from drinking water. Many SSF plants have been constructed in recent years, especially for small communities in the Northwest and Northeast.

Slow sand filtration is a biological-physical process. Water is passed through a bed of fine, uniform sand at a slow rate relative to conventional rapid sand filtration (about 100 times slower). Removal of turbidity and microorganisms occurs in part by physical means (straining) but largely by the biological growth that develops in the sand bed and on the surface of the sand. The growth on the surface of the sand is called the schmutzdecke, a German word for "dirty layer" or "dirty blanket."

A summary of slow sand filtration theory can be found in the *Manual of Slow Sand Filtration*, published by the International Reference Center for Community Water Supply and Sanitation (Netherlands):

> "Slow sand filtration is a purification process in which the water to be treated is passed through a porous bed of filter medium. During this passage the water quality improves considerably by reduction of the number of microorganisms (bacteria, viruses, cysts), by removal of suspended and colloidal material, and by changes in its chemical composition. In a mature bed a thin layer called the Schmutzdecke forms on the surface of the bed. This Schmutzdecke consists of a great variety of biologically very active microorganisms which break down organic matter, while a great deal of suspended inorganic matter is retained by straining. The slow sand filtration process is essentially distinguished from rapid sand filtration by the Schmutzdecke and the purification processes which take place in this thin surface layer. The main feature of rapid sand filters is the removal of relatively large suspended particles by physical processes. Moreover, rapid sand filters require cleaning by a rather complicated backwashing operation, whereas slow sand filters are cleaned by the relatively simple periodical removal of the top of the filter bed, including the Schmutzdecke.

> In principle, the porous substance of the filter bed may be any stable material, but in the domestic water supply field the normal practice is to use beds of granular material. Sand in particular is used as it is cheap, inert, durable, widely available, and gives excellent results."

SSF could be called a passive filtration process, because it is subject to very little control by an operator. Besides flow control and monitoring tasks, the only regular operator task is removal of the schmutzdecke when the filter becomes clogged. This removal is termed "scraping." The drawback to operational simplicity is the relative inflexibility of SSF. There are very few modifications that an operator can make to improve its performance or to adapt the plant to changing water quality conditions.

2.2 Slow Sand Filtration Regulations

The United States Environmental Protection Agency (USEPA) establishes standards and monitoring requirements for contaminants in drinking water to meet the obligations of the Safe Drinking Water Act. Unlike in most states, USEPA has primacy over water systems within the State of Wyoming, so the responsibilities for ensuring that drinking water is safe are shared between the Wyoming Department of Environmental Quality (WDEQ) Water Quality Division (WQD) and the USEPA Region 8. The primary regulation relating to filtration is the Surface Water Treatment Rule (SWTR), and few state regulations are in place in Wyoming beyond those established by it. However, the WDEQ has established minimum construction standards that must be complied with in order to obtain permits for construction of any public water system. These requirements are summarized in Chapter 12 of the *Water Quality Division Rules and Regulations*.

The Douglas WTP must be in compliance with both the Federal and State regulations. The following provides an overview of these standards.

Long Term 2 Enhanced Surface Water Treatment Rule

Current SWTR regulations require 3-log *Giardia* and 4-log virus treatment as well as a minimum of 2-log *Cryptosporidium* treatment for both filtered and unfiltered systems. All filtered systems are required to achieve a minimum of 3-log *Cryptosporidium* reduction. EPA credits slow sand filtration with 3-log *Cryptosporidium*, 2-log *Giardia*, and 2-log virus removal unless site specific demonstrations studies are conducted to demonstrate greater removal. Therefore, 1-log *Giardia* and 2-log virus inactivation is required by the disinfection system at Douglas.

The filtered water turbidity for slow sand filtration must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month. Since the standard is 1 NTU and not 1.0 NTU, 95 percent of the measurements can be up to 1.49 NTU and still comply. The filtered water turbidity must never exceed 5 NTU.

USEPA has determined that the minimum *Cryptosporidium* reduction is not adequate treatment for systems with high source water *Cryptosporidium* levels. As a result, the LT2ESWTR applies additional treatment requirements for *Cryptosporidium* in public water systems. The rule uses a risk based approach for control of *Cryptosporidium*. To do so, systems must initially monitor their source waters for *Cryptosporidium* levels. The

monitoring results are then used to classify the system in different bins, which determine the extent of additional treatment required.

Small filtered systems such as the City of Douglas (i.e., those serving fewer than 10,000 people) may use indicator organisms in lieu of *Cryptosporidium* to meet monitoring requirements. These systems must initially sample their source water for *E. coli* at least bi-weekly for one year. Monitoring for small systems must begin no later than October 1, 2008.

If the initial *E. coli* monitoring indicates a mean concentration greater than 10 *E. coli*/100mL for systems using a reservoir or lake as their primary source or greater than 50 *E. coli*/100mL for systems using a flowing stream as their primary source, then *Cryptosporidium* monitoring must be conducted. Small systems that exceed *E. coli* trigger values must conduct one year of *Cryptosporidium* sampling twice per month.

The *E. coli* or *Cryptosporidium* monitoring results will then be used to classify a system within a bin. If the *E. coli* monitoring indicates lower values than presented above, then a system will be classified as Bin 1. If the values are exceeded and *Cryptosporidium* monitoring is required, then the bin classification is determined by averaging the *Cryptosporidium* concentrations measured for individual samples. Additional log treatment for *Cryptosporidium* is required based on the bin classification of the system.

Under LT2ESWTR, slow sand filtration is credited with 3-log *Cryptosporidium* removal. Based on a system's bin classification, additional treatment may be required for slow sand filtration systems. **Table 2** shows the bin classification and corresponding additional treatment required for slow sand filtration based on the source water monitoring.

TABLE 2
Bin Classification and Additional Log Treatment Required for Slow Sand Filtration Based on Source Water Monitoring per LT2ESWTR

Oocysts in Source Water (#/L)	Bin Classification	Additional Log Removal/Inactivation Required for Slow Sand Filtration
<0.075	1	No additional treatment
≥0.075 and <1.0	2	1.0
≥1.0 and <3.0	3	2.0
≥3	4	2.5

If the Douglas WTP is classified as Bin 1 as part of LT2ESWTR, no additional credit for *Cryptosporidium* treatment will be required beyond that attained by slow sand filtration. However, if the WTP is classified in Bin 2 or greater for LT2ESWTR, additional measures will be required.

Disinfectants and Disinfection Byproducts Rule

The Disinfectants and Disinfection Byproducts Rule (D/DBPR) is designed to decrease disinfection byproduct occurrence peaks in a system's distribution system based on changes to compliance monitoring provisions. In Stage 2B, all systems must continue to comply with Stage 1 MCLs of 0.080 mg/L TTHM and 0.060 mg/L HAA5 as locational running annual

averages using sampling sites identified under the initial distribution system monitoring (IDSE) results. The IDSE consists of a study with the purpose of selecting site-specific optimal sample points for capturing peaks of TTHMs and HAA5s. Small systems serving 500 to 9,999 people must monitor quarterly for each treatment plant by taking two dual sample sets at these identified sample sites with representative high HAA5 levels and high TTHM levels.

Reduction of natural organic matter (NOM) will assist in reducing the disinfection byproducts formed by the use of free chlorine. It is expected that the use of slow sand filtration will reduce the plant influent NOM to allow for continued use of free chlorine for disinfection while meeting disinfection byproduct requirements. In addition, the water treated from the plant will be blended with the City's two groundwater systems early in the distribution system. The groundwater systems have very low disinfection byproducts, well within the regulatory limits, and would likely offset any potential disinfection byproduct formation in the surface water supply.

2.3 Monitoring for Current SWTR

There are various monitoring requirements that must be performed for the Douglas WTP as part of the current Surface Water Treatment Rule (SWTR). The monitoring requirements for the WTP are described below and include disinfection and turbidity monitoring and reporting. EPA may require additional monitoring requirements, so reporting schedules and final requirements must be approved by the EPA for compliance with the Safe Drinking Water Act.

There also are several monitoring requirements that must be performed for the City of Douglas distribution system. It is important to note that the distribution system consists of treated water from multiple sources of the City's, including the WTP when on-line. The City should be undergoing this sampling already independent of the WTP operations. The City should be following EPA guidance on distribution system monitoring requirements.

Disinfection Requirement

Current SWTR regulations require 3-log *Giardia*, 4-log virus, and a minimum 3-log *Cryptosporidium* reduction for filtration plants. EPA credits slow sand filtration with 3-log *Cryptosporidium*, 2-log *Giardia*, and 2-log virus removal unless site specific demonstrations studies are conducted to demonstrate greater removal. Therefore, 1-log *Giardia* and 2-log virus inactivation is required by the disinfection system at Douglas.

Regulations require that chlorine remain in contact with filtered water for a minimum time period prior to being distributed for potable use. The clearwell provides this disinfection contact time. The Douglas WTP is required to meet minimum disinfection CT values for 1-log *Giardia* and 2-log virus inactivation. A CT value is the product of the chlorine residual at the compliance point ("C") and the contact time provided to this location ("T"). The required CT value that Douglas WTP must meet depends on the temperature and pH of the water. Calculations will be performed by the plant control system to monitor the performance of the chlorination system through the clearwell for regulatory compliance. The calculations performed on a continuous basis are outlined under section 3.6 Clearwell and Chlorination.

In addition, the residual disinfectant concentration must be continuously monitored at the entry to the distribution system and cannot be less than 0.2 mg/L for more than 4 hours. This is monitored at the Douglas WTP by the chlorine analyzer located at the effluent of the clearwell. The lowest daily value for each day must be recorded and reported every month. If the residual disinfectant was less than 0.2 mg/L, the date, duration, and when the state was notified of the event also must be reported.

Turbidity

Specific combined filter effluent (CFE) turbidity requirements depend on the type of filtration used by the WTP. The CFE turbidity for slow sand filtration must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month. Since the standard is 1 NTU and not 1.0 NTU, 95 percent of the measurements can be up to 1.49 NTU and still comply. The CFE turbidity must never exceed 5 NTU. CFE must be monitored at least every 4 hours to ensure compliance with CFE turbidity performance standards. This frequency may be reduced by the State to once per day for systems using slow sand/alternative filtration.

The Douglas WTP has a turbidimeter that continuously monitors the finished water turbidity and alarms if greater than 1.0 NTU. Since the CFE may meet regulatory requirements even though one filter is producing high turbidity water, the individual filter effluent (IFE) also is measured continuously with a turbidimeter to assist the plant operator in understanding and assessing individual filter performance. Deviations from the turbidity requirements should be well documented; the cause (such as calibration, sampling problems, etc.) as well as the duration should be noted.

3.0 Overview of Plant Operations

Design criteria for Douglas WTP are summarized in **Table 1**. A Process Flow Diagram and Hydraulic Profile are included in the **Appendix**. Also included are some facility drawings with valve ID numbers added to help identify referenced valves in the following text.

The water treatment plant will operate seasonally from May to September. River water is pumped into two presedimentation pond cells, which are designed to remove turbidity, such as dirt and clay particulates, from the water. If the river turbidity is excessively high (>50 NTU), operators should cease operation of the low lift pumps and the treatment plant should be removed from service until the river water quality returns to within normal operating conditions. Since slow sand filters typically remove 80 to 90 percent of turbidity, slow sand filters should not be fed water that is 10 NTU or higher to be sure to meet the CFE turbidity regulation. The supernatant water is collected from the presedimentation pond cells and fed into a flow splitting structure for the slow sand filters. If necessary, the presedimentation pond cells can be bypassed by opening the 12-inch raw water (presedimentation bypass) valve located directly south of the Presedimentation Pond Cell #1 outlet box (Valve ID No. 1), closing the 6-inch presedimentation influent valve for each pond cell (Valve ID No. 2 and 3), and closing the 12-inch filter influent valve in each presedimentation pond cell outlet box (Valve ID No. 7 and 11).

The plant uses three slow sand filters. They are identically sized at 116 by 60 feet each. This gives a filter area of 6,960 square feet each, or 20,880 square feet total. At the capacity of

2,000,000 gallons per day, water is passed through the filters at a rate of 96 gallons per day per square foot. This is within the typical range for SSF of 70 to 150 gallons per day per square foot.

The intent is to use all three filters continuously through the summer. During the winter months, when water demands are lower, the filters will be drained. If one filter needs to be taken off line during the summer for cleaning or maintenance, the rate to the two operating filters will be increased by 50 percent to make up the difference. Even at the maximum capacity of 2,000,000 gallons per day, the filtration rate for only two filters operating will remain at an acceptable level of 144 gallons per day per square foot.

Maintaining an exact filtration rate is not a major operational requirement for effective treatment. However, to maintain continuous operation (no intermittent starts and stops) and to avoid sudden changes in filtration rates are the important operational requirements.

The plant uses inlet flow control, meaning that the flow rate adjustment is made for the raw water entering the presedimentation pond, which flows by gravity to the filter flow splitting structure. The operator adjusts the raw water flow by selecting the desired combination of raw water pumps and by adjusting the settings of the variable speed pumps. From the flow splitting structure, the total flow is divided equally among the three filters. As one filter becomes plugged, the water level rises to provide sufficient head so that the flow rate among filters remains equal. Eventually, the water rises to the maximum allowable level (the overflow level in the filters). When that happens, it is time to remove that filter from service and clean it.

The filters were constructed with an initial sand depth of 36 inches. Each time a filter is cleaned, a small amount (about ¼ to ½ inch) of sand will be removed. When the sand depth is reduced to between 18 and 24 inches, it is time to resand the filters. Many SSF plants have found that 18 inches still provides acceptable treatment, but if a degradation in filtered water quality is noted prior to reducing the depth to 18 inches, the filter(s) should be resanded.

The final step in the treatment process is disinfection by chlorination. Chlorine is added after the water is filtered and prior to when it enters the clearwell. Contact is provided in the clearwell.

The following components of plant operation and further described in the below paragraphs:

- Raw Water Low Lift Pumps
- Presedimentation Pond Cells
- Plant Drain Manhole
- Filter Operation
- Chlorine Injection Manhole
- Clearwell and Chlorination
- Finished Water High Service Pumps
- Seasonal Plant Startup
- Temporary Plant Shutdown and Startup
- Seasonal Plant Shutdown

3.1 Raw Water Low Lift Pumps

There are a total of three low lift pumps, two variable speed pumps (No. 2 and No. 3) and one constant speed pump (No. 1). The constant speed pump No. 1 serves as a backup to the two variable speed low lift pumps. Normally, one or both of the variable speed low lift pumps will be used to provide influent flow to the plant.

One variable speed pump provides enough capacity to handle flow rates of 350 to 900 gpm (0.5 to 1.3 mgd), but both pumps are required to handle the plant design capacity of 2 mgd. The pumps are to operate in a lead and lag configuration. The lead pump runs when the influent flow set point is within its capability and the lag pump runs when the set point requires the second pump. The speed of the pump or pumps is adjusted automatically to deliver the influent flow. If the influent flow set point requires both pumps to run, then both run at the same speed to maintain the influent flow. If the flow rate requires one pump, and the lead pump should fail, the lag pump automatically runs in its place, maintaining the influent flow. If the flow set point requires two pumps, and either the lead or lag pump should fail, then the constant speed pump No. 1 runs in its place, and the remaining variable speed pump continues to run, maintaining the influent flow.

A magnetic flowmeter will measure the influent flow and low lift pump discharge pressures will be monitored. The raw water turbidity will be continuously monitored and a high alarm will be triggered if the turbidity is greater than 10 NTU, and a high-high alarm will occur at 50 NTU. The raw water pH and temperature also will be monitored and an alarm will occur if the pH is out of the expected range of 6.5 to 8.0.

3.2 Presedimentation Pond Cells

There are two presedimentation pond cells, which are designed to remove turbidity, such as dirt and clay particulates, from the water. Each presedimentation pond cell holds 1,000,000 gallons. The pond cells were sized so that when both pond cells are in use and the plant is running at the design capacity of 2 MGD, the detention time will be 24 hours. Therefore, to obtain this required minimum 24-hour detention time, both presedimentation pond cells must be used when the plant influent flow is greater than 1 MGD.

The water levels above the Presedimentation Cell 1 and Cell 2 outlet weirs will be continuously monitored and alarm if the levels are not within the expected range. The water level above the weir crest is dependent upon the influent flow rate, the number of cells in service, and each cell's corresponding headloss. The greater the influent flow rate, the greater the level over the weir sills. If one cell is in service, all influent flow is over one weir sill, hence a higher water level. If two cells are in service, flow is split between the two cells and the level over the weir sills is lower. In addition, Cell 1 has a longer run of discharge piping than Cell 2, so it has a greater head loss, resulting in higher level above its weir sill. The water level low-low alarm set point corresponds to the weir sill level and high-high alarm set point corresponds to the top of the rectangular weir opening, which is 2 feet above the weir sill level.

The presedimentation pond cells were designed so that the accumulated solids at the bottom of the cell should remain in the cell rather than being discharged to the river during draining. For each cell, most of the water will be drained via a pipe that is set 2 feet above the bottom of the pond cell as to not disturb the settled solids. Water from the last couple of

feet of each cell will be drained via a perforated pipe located in a trench surrounded with drainage material and a geotextile filter to keep the solids in the pond cells. Following pond drainage, the remaining solids at the bottom of each cell will need to be scraped, trucked, and disposed off-site.

3.3 Plant Drain Manhole

The plant drain manhole was designed to drain by gravity to the river during the filter-to-waste operation at plant start-up and for draining the presedimentation pond cells and filters at plant shut-down. However, to drain the last 2 feet in the filters, the plant drain manhole sump pump must be used. The plant drain manhole sump level will be continuously monitored and alarm if the level becomes too high.

If both presedimentation pond cells are full of water, it will take approximately 1 day to drain both cells at the same time. If all three filters are full of water, it will take approximately 1 day to drain all of the filters at the same time. Presedimentation pond cells and filters should not be drained all at the same time. The maximum drainage flow rate should be approximately 2 mgd to avoid overflowing the plant drain manhole.

3.4 Filter Operation

The treatment effectiveness of SSF is primarily dependent on how developed a filter is biologically, both within the sand bed and on the schmutzdecke. Therefore, a new filter placed online will not immediately achieve proper treatment. The filter must first biologically mature or "ripen." The ripening period can range from a few days to several weeks, depending on water quality and temperatures.

Coliform reduction is a good method to determine biological maturity within a slow sand filter. During season startup of the filters, total and fecal coliform density testing may be performed daily in the raw and filtered water. As the filter matures, a very clear drop in filtered water coliform levels will occur. The total coliform level tends to fluctuate somewhat even for fully matured filters. Filtered water fecal coliform levels will drop to zero and only rarely will a value other than zero occur in a mature filter. After filter cleaning (scraping) during the operational season, the filter should be run in the filter-to-waste mode for one or two days, and then a fecal coliform sample may be taken. If the fecal coliform is zero, then the filter may be placed into service.

A turbidimeter continuously monitors the finished water turbidity and a high alarm will occur if the turbidity is greater than 1.0 NTU, and a high-high alarm will occur at 1.2 NTU. Since the combined filter effluent may meet regulatory requirements even though one filter is producing high turbidity water, the individual filter effluent also is measured continuously with a turbidimeter to assist the plant operator in understanding and assessing individual filter performance. The water level for each filter also will be monitored. A high alarm will alert when the water level reaches the overflow for the filter.

The four primary operator responsibilities for filter operation are discussed in the following paragraphs:

- Flow Control
- Filter Cleaning
- Resanding
- Monitoring/Record Keeping

Flow Control

The purpose of flow control is to provide a constant rate of flow to the filters at a hydraulic loading rate equal to or less than the design value of 96 gpd/sf for three filters in operation. It is not necessary to maintain the exact design rate. Instead, the goal is to maintain continuous operation (no intermittent stops and starts) and to avoid sudden changes in filtration rate. Flow rate changes should be made infrequently and gradually, preferably not more than once per day as a rule of thumb. More frequent changes may negatively impact filtration performance. Generally, a 15 percent increase or decrease in the filter loading rate per day is acceptable. If the number of filters that the flow is split among remains the same, the change would equate to a 15 percent adjustment in the flow rate as well.

The filters are designed as influent control. This means that flow rate adjustments are made by selecting the number of raw water pumps operating (one to two) and the speed of the variable speed pumps (Low Lift Pumps No. 2 and No. 3). The total raw water flow rate is continuously monitored and recorded by a magnetic flow meter. The filter influent flow splitting structure was designed so that the total flow would be evenly distributed among the three filters. If needed, slight adjustments can be made by adjusting the elevation of the weir plates on the flow splitting structure and/or by partially closing one or more of the isolation valves on the inlet lines to individual filters.

Table 3 relates the total raw water flow to hydraulic loading rates for the conditions of having two or three filters operating. Normally, all three filters will be used, unless one filter is down for maintenance.

TABLE 3
Comparison of Raw Water Flow to Hydraulic Loading Rate

Raw Water Flow, gpm (gpd)	Hydraulic Loading Rate for 3 Filters Operating, gpm/sf (gpd/sf)	Hydraulic Loading Rate for 2 Filters Operating, gpm/sf (gpd/sf)
350 (504,000)	0.017 (24)	0.025 (36)
500 (720,000)	0.024 (34)	0.036 (52)
700 (1,008,000)	0.033 (48)	0.050 (72)
900 (1,296,000)	0.043 (62)	0.065 (93)
1100 (1,584,000)	0.053 (76)	0.079 (114)
1389 (2,000,000)	0.066 (96)	0.100 (144)

Plant capacity of 2 mgd based on a hydraulic loading rate of 0.066 gpm/sf (96 gpd/sf) with 3 filters operating and 0.100 gpm/sf (144 gpd/sf) with 2 filters operating.

Filter Cleaning (Scraping) During Operational Season

When the headwater approaches the overflow level for a filter, the filter should then be taken out of normal operation and the top layer scraped. Some communities have found it advantageous to anticipate when scrapings will be needed, and sometimes scrape a filter before it is absolutely necessary, so that two filters do not come due for a scraping at the same time. If a filter overflows and is not immediately removed from service and scraped, the production from that filter will decrease by an amount equal to what is overflowing, but the filter's efficiency in removing turbidity and microorganisms will not be reduced.

Plugging of a filter may be caused by particulate matter or algae, and commonly, by a combination of the two. Therefore, any measures that the operator can take to reduce particulate loadings onto the filters or algae growth in the source water or above the filters will be beneficial for lengthening filter runs.

Manual scraping is usually done with broad flat shovels. The scraped layer is shoveled into wheelbarrows or other transport devices. During cleaning operations, precautions should be taken to minimize contamination of the sand bed by the operators. Any unnecessary access by people or vehicles should be avoided, and all contaminants (especially oil, grease, etc.) should be kept away from the filter. Operators should not walk directly on the filter sand without the use of planks to distribute their weight. Rubber boots should be worn by those who work in the filter bed and these should be disinfected in a tray of chlorine solution. **Figure 1** is a picture of the scraping process, in which the workers used flat shovels to scrape and rubber boots with attached pieces of board to distribute their weight.



FIGURE 1
Filter Scraping Process

Procedures for scraping filters are outlined in the following list. The general rule is to complete this process in as short a time frame as possible to lessen disturbance to the biological growth in the filter. Included in the **Appendix** are some facility drawings with valve ID numbers added to help identify referenced valves in the following text.

1. Close the 12-inch filter influent valve to the filter, which is located in the filter influent flow splitting structure on the north side of the filter basins (Valve ID No. 12, 13, or 14).
2. Allow the water level in the filter to drop to its minimum level by the normal filtration operation. The minimum level will be level with the weir in the filter outlet box.
3. Close the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, or 22).
4. Open the 8-inch buried drain valve that is located just outside of the filter outlet box on the north side (Valve ID No. 15, 18, or 21).
5. Open the 6-inch drain valve located in the east half of the filter outlet box (Valve ID No. 17, 20, or 23). Lower the water level to about 2 to 4 inches below the top of the sand, and then close the valve. The ideal water level is when the sand is just dry enough to support the scraping activities over the top. This level will be determined by experience. The concern with draining the filter lower than necessary is that the biological growth in the sand bed will be interrupted.
6. The next step is to scrape the filter. Remove the schmutzdecke and about ¼ to ½ inch of sand. Handle and stockpile the removed sand in a manner that keeps it as clean as possible, since it may be reused in the future.
7. When the scraping has been completed, open the 12-inch filter influent valve to the filter (Valve ID No. 12, 13, or 14), which puts the filter into filter-to-waste operation. The water level will rise and spill over the weir in the filter outlet box and drain to the river through the open 8-inch drain valve (Valve ID No. 15, 18, or 21). Filter-to-waste protects against an initial period of poor treatment that may follow a filter cleaning. Continue the filter-to-waste operation until coliform sampling (as described under 3.4 Filter Operation) determines biological maturity within the slow sand filter and the filter effluent reaches acceptable standards (as described under 2.2 Slow Sand Filtration Regulations).
8. After the effluent reaches acceptable standards, close the 8-inch drain valve (Valve ID No. 15, 18, or 21) and open the 8-inch filter effluent valve (Valve ID No. 16, 19, or 22) to return the filter to normal operation.

Resanding

After many successive scrapings, the depth of the sand will have been reduced to its minimum operating depth of 18 to 24 inches. Replenishment of the sand bed (resanding) will be required. The initial sand depth was 36 inches. Therefore, 12 to 18 inches of sand can be removed before resanding is needed. If filtered water quality deteriorates prior to this level, resanding should be performed at that time.

Removed sand can be cleaned and replaced onto the filters or new sand can be used for the resanding. As shown in **Table 1**, the initial sand had an effective size of 0.15 to 0.30 mm and a maximum uniformity coefficient of 2.5. It is recommended that similar specifications be used for replacement sand.

In the resanding operation, part of the original sand remaining in the filter should be excavated and "thrown over" the top of the replenished sand. This can be done by excavating a trench in the sand bed in a long strip, making sure that it is not excavated too deep to disturb the underdrain gravel layers below. The removed sand from the trench is stacked to one side in a long ridge. The excavated trench is then filled with new sand. The adjacent strip is then excavated, throwing the removed material from the second trench to cover the new sand in the first trench, and so on. This operation of moving part of the original sand in the filter to the top of the new sand can minimize the cumulative plugging of the old sand and promote the ripening of the sand bed after the resanding process. **Figure 2** (taken from the 1991 Manual of Design for Slow Sand Filtration, American Water Works Association Research Foundation) shows the resanding procedure.

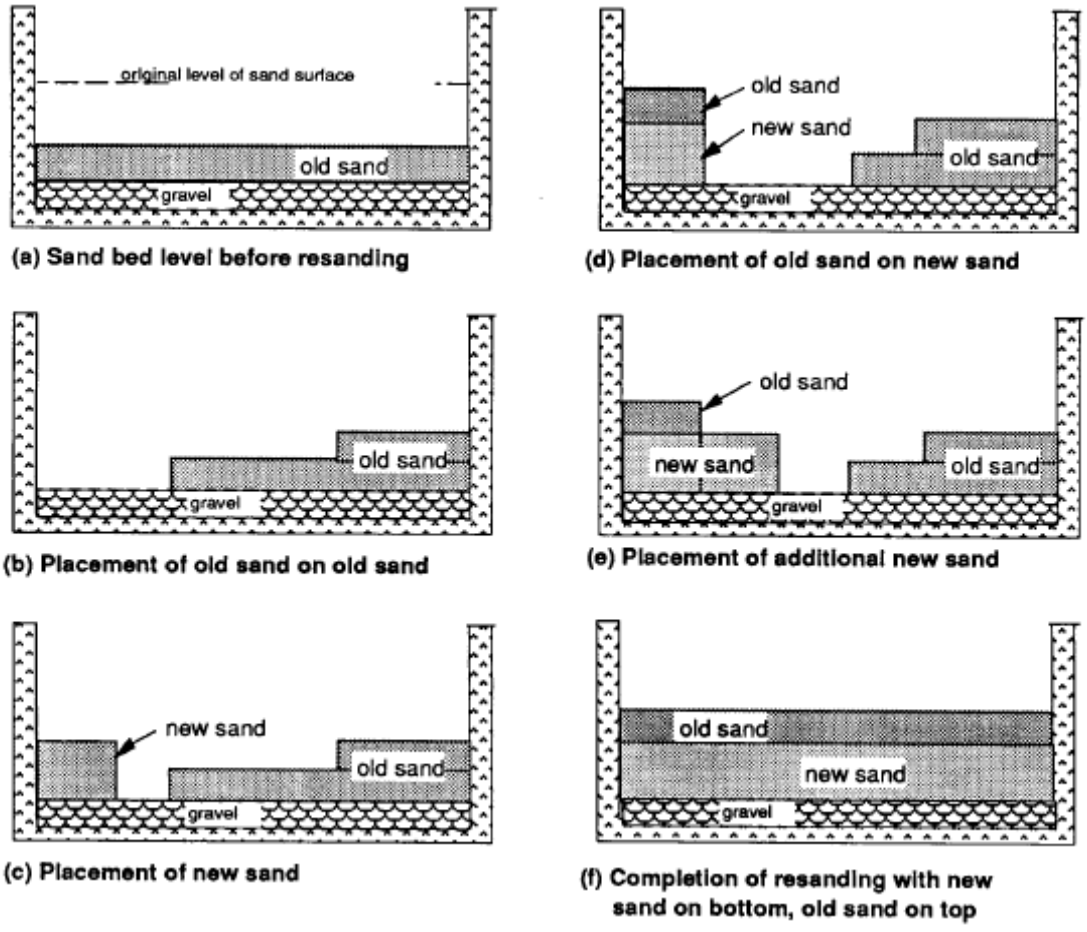


FIGURE 2
Resanding Procedure

Monitoring/Record Keeping

A sample record keeping form for monitoring the performance of the filters is included in the **Appendix**. This form records combined filter data (information common to all filters) for production, hydraulic loading rate, raw and filtered turbidity, applied and residual chlorine, temperature, and notes. Data specific to each filter can be recorded under two columns, filtered turbidity and headwater depth (depth of water above the filter surface). Information to record in the notes column should include dates of scrapings, flow adjustments, raw and filtered coliform sampling results, summaries of maintenance performed, and any other information relating to the operation or performance of the filter.

This form is intended as a sample and should be modified by the operator based on experience in operating the plant. The operator will also need to record other information as required by the WDEQ and US EPA.

3.5 Chlorine Injection Manhole

The chlorine injection manhole is located just outside of the NE corner of the clearwell. Chlorinated water is injected into the filter effluent water at this location to aid mixing of the chlorine and water before it reaches the clearwell. The chlorine injection manhole will be continuously monitored and alarm if a water leak is detected.

The chlorine injection manhole also includes clearwell and chlorine solution isolation valves. The 12" actuating butterfly valve on the filter effluent line (Valve ID No. 24) and the solenoid valve on the chlorine solution line (Valve ID No. 25) close if a high-high level alarm is triggered in the clearwell (from finished water high service pump failure) or if a power outage occurs.

3.6 Clearwell and Chlorination

The clearwell serves two purposes. One purpose is that is serves as a pump well for the finished water pumps. It absorbs the variations in flow that occur throughout the day, including the mismatch between raw and finished water pumping rates. The second purpose is that the clearwell provides disinfection contact time. Regulations require that chlorine remain in contact with filtered water for a minimum time period prior to being distributed for potable use.

The Douglas WTP is required to meet minimum disinfection CT values. A CT value is the product of the chlorine residual ("C") at the compliance point and the contact time ("T") provided to this location. The CT value that Douglas WTP must meet depends on the temperature and pH of the water, as well as required *Giardia* log inactivation and the chlorine residual. Based on a maximum pH of 8.5, minimum water temperature of 13° C (in the months when the plant will be operational, May to September), 1-log required *Giardia* inactivation, and a chlorine residual of 0.9 mg/L, state and federal rules require that the plant provide a CT value of 51.1 mg*min/L.

The plant control system will perform calculations to monitor the performance of the chlorination system through the clearwell for regulatory compliance. The following calculations will be performed on a continuous basis.

1. Determine Free Chlorine T_{10} Time (min) in Clearwell:
    a. Given: Flow Rate, Q (mgd), through clearwell (read from the finished water magnetic flow meter FIT 4001)
    b. Given: Area, A, for free chlorine contact = 1,792 square feet
    c. Given: Water Level, L (feet), in clearwell (read from the clearwell level indicator LIT 4001)
    d. Given: Hydraulic Efficiency, E, through clearwell = 0.70 (70%)
    e. Calculate: $T_{10\text{-}Cl2}$ Time (min):

$$T_{10-Cl2} = \frac{E * A * L * 7.48}{Q}$$

2. Determine Residual Chlorine Concentration (mg/L) of Treated Water:
    a. Given: Treated Water Concentration, C_{Cl2}; plant SCADA to read from analyzer
3. Determine Actual CT Achieved (mg*min/L) in Clearwell:

$$CT_{Actual\text{-}Cl2} = C_{Cl2} * T_{10\text{-}Cl2}$$

Along with the pH and temperature, the clearwell effluent chlorine residual is continuously monitored and will alarm if not within the expected range of 1.0 to 1.4 mg/L. The turbidity also is monitored and a high alarm will be triggered if the turbidity is greater than 1.0 NTU, and a high-high alarm will occur at 1.2 NTU.

3.7 Finished Water High Service Pumps

There are two variable speed high service pumps (No. 1 and No. 2). One pump provides enough capacity to handle the plant design flow rate of 2 mgd, with the other pump serving as a backup. The pumps are to operate in a lead and lag configuration. The clearwell water level is continuously monitored and the lead pump starts on an upper water level (9.4 feet) and stops on a lower water level (8.6 feet). Its speed is adjusted automatically to maintain a steady state middle level in the clearwell for retention time. In the event the lead pump should fail, the lag pump automatically runs in its place, maintaining the clearwell level.

A magnetic flowmeter will continuously measure the clearwell effluent flow. There is a 2-foot difference between the low-low and high-high alarm (8 to 10 feet) for the clearwell water level. The water level in the East Storage Tank also will be continuously monitored and alarm if levels are not within the acceptable range.

3.8 Seasonal Plant Startup

To startup the plant in the spring, perform the steps outlined below. Included in the **Appendix** are some facility drawings with valve ID numbers added to help identify referenced valves in the following text.

1. To disinfect filters, filter effluent piping, and clearwell, refer to the Disinfection Procedures in the **Appendix**.

2. Re-install filter effluent turbidimeter for each filter.

3. For each presedimentation pond cell that is to be used, verify the 6-inch presedimentation influent valve located between the two pond cells on the north side (Valve ID No. 2 and/or 3) is open. If one of the pond cells is not required, close that pond cell's influent valve.

4. For each presedimentation pond cell that is to be used, close the 4-inch drain valve on the north side (Valve ID No. 4 and/or 8) and both 8-inch drain valves, one on the south side (Valve ID No. 6 and/or 10) and one on the north side (Valve ID No. 5 and/or 9) in each presedimentation outlet box.

5. For each presedimentation pond cell that is to be used, verify that the 12-inch presedimentation effluent valve located in each presedimentation outlet box on the south side (Valve ID No. 7 and/or 11) is open. If one of the pond cells is not required, close that pond cell's effluent valve.

6. For each filter that is to be used, verify that the 12-inch filter influent valve is open. These valves are located in the filter influent flow splitting structure on the northeast side of the filter basins (Valve ID No. 12, 13, and/or 14). If a filter is not required, close that filter's valve.

7. Close only the 6-inch drain valve located in the east half of the filter outlet box for each filter that is to be used (Valve ID No. 17, 20, and/or 23). Leave the 8-inch buried drain valve located just outside of the filter outlet box on the north side (Valve ID No. 15, 18, and/or 21) open so that filter-to-waste water will drain back to the river. Close the 8-inch buried drain valve for any filter that is not being used. Verify the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, and 22) is closed.

8. Start up the raw water low lift pump(s).

9. Continue the filter-to-waste operation until coliform sampling (as described under 3.4 Filter Operation) determines biological maturity within a slow sand filter and the filter effluent reaches acceptable standards (as described under 2.2 Slow Sand Filtration Regulations). Then, close the 8-inch buried drain valve that is located just outside of the filter outlet box on the north side (Valve ID No. 15, 18, and/or 21), and open the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, and/or 22) to put the filter into operation.

10. Open the 12-inch clearwell isolation valve (Valve ID No. 24) and the chlorine solution solenoid valve (Valve ID No. 25). Turn on the chlorine gas eductor system.

11. Fill clearwell and verify that the lead finished water high service pump starts at the designated upper water level of 9.4 feet.

3.9 Temporary Plant Shutdown and Startup

A temporarily shutdown/startup of the plant may be necessary for an event such as excessively high raw water turbidity. Included in the **Appendix** are some facility drawings with valve ID numbers added to help identify referenced valves in the following text.

Shutdown

To temporarily shut the plant down, perform the following steps:

1. Shut down raw water low lift pump(s).
2. Close the 12-inch presedimentation effluent valve located in presedimentation outlet box on the south side (Valve ID No. 7 and/or 11) for each presedimentation pond cell that was in use.
3. Close the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, and/or 22) for each filter that was in use.
4. Turn off the chlorine gas eductor system. The finished water high service pump will continue to pump the water from the clearwell until the clearwell reaches the low water level of 8.6 feet. At that time the pump will stop.

Alternative Shutdown Method

An alternative shutdown method includes the following:

1. Shut down raw water low lift pump(s).
2. Allow the water level in each presedimentation pond cell and filter to drop to its minimum level by the normal filtration operation and adjust chlorine addition accordingly. The minimum level for each presedimentation pond cell will be level with the weir in the filter flow splitting structure, and the minimum level for each filter will be level with the weir in filter outlet box.
3. Close the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, and/or 22) for each filter.
4. Turn off the chlorine gas eductor system. The finished water high service pump will continue to pump the water from the clearwell until the clearwell reaches the low water level of 8.6 feet. At that time the pump will stop.

Startup

To start up the plant from a temporarily shutdown, perform the following steps:

1. Open the 12-inch presedimentation effluent valve located in presedimentation outlet box on the south side for each presedimentation pond cell to be used (Valve ID No. 7 and/or 11). If the alternative shutdown method was used, this step is not necessary.
2. Verify the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side for each filter (Valve ID No. 16, 19, and/or 22) is closed. Open the

8-inch buried drain valve that is located just outside of the filter outlet box on the north side for each filter (Valve ID No. 15, 18, and/or 21) so that filter-to-waste water will drain back to the river.

3. Start up raw water low lift pump(s).

4. Since stopping and starting the filters may cause a bump in turbidity, continue the filter-to-waste operation until the filter effluent turbidity reaches acceptable standards (as described under 2.2 Slow Sand Filtration Regulations). If the plant has been shut down for an extended period (i.e., 7 days or greater), coliform sampling may be required as described under 3.4 Filter Operation. Then, close the 8-inch buried drain valve that is located just outside of the filter outlet box on the north side (Valve ID No. 15, 18, and/or 21), and open the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side (Valve ID No. 16, 19, and/or 22) to put the filter into operation.

5. Turn on the chlorine gas eductor system.

6. Fill clearwell and verify that the lead finished water high service pump starts at the designated upper water level of 9.4 feet.

3.10 Seasonal Plant Shutdown

To shut the plant down for the winter, perform the steps outlined below. Included in the **Appendix** are some facility drawings with valve ID numbers added to help identify referenced valves in the following text.

1. Shut down raw water low lift pump(s).

2. Close the 8-inch buried filter effluent valve that is located just outside of the filter outlet box on the west side for each filter (Valve ID No. 16, 19, and 22).

3. Turn off the chlorine gas eductor system. The finished water high service pump will continue to pump the water from the clearwell until the clearwell reaches the low water level of 8.6 feet. At that time the pump will stop.

4. Drain clearwell to sanitary sewer.

5. In each presedimentation outlet box, open the 4-inch drain valve on the north side (Valve ID No. 4 and 8) and both 8-inch drain valves, one on the south side (Valve ID No. 6 and 10) and one on the north side (Valve ID No. 5 and 9) to drain the water from the presedimentation pond cells to the river. Following pond drainage, the remaining solids at the bottom of each cell may need to be scraped, trucked, and disposed off-site depending on the amount accumulated.

6. Once the presedimentation pond cells have been drained, open the 8-inch buried drain valve that is located just outside of the filter outlet box on the north side (Valve ID No. 15, 18, and 21) and open the 6-inch drain valve located in the east half of the filter outlet box for each filter (Valve ID No. 17, 20, and 23) to drain the water from the filters to the river.

7. The next step is to scrape the filter. This process can begin once the water level is about 2 to 4 inches below the top of the sand. Remove the schmutzdecke and about ¼ to ½ inch of sand. Handle and stockpile the removed sand in a manner that keeps it as clean as possible, since it may be reused in the future. Care should be taken on the filter surface; avoid any unnecessary access by people or vehicles, and keep all contaminants (especially oil, grease, etc.) away from the filter. Operators should not walk directly on the filter sand without the use of planks to distribute their weight.
8. Drain the last 2 feet in the filters by using the plant drain manhole sump pump.
9. Remove filter effluent turbidimeter for each filter and store indoors for the winter.
10. Verify all presedimentation pond cell drain and effluent valves are open (Valve ID No. 4, 5, 6, 7, 8, 9, 10, and 11). Also, verify all filter influent and drain valves are open (Valve ID No. 12, 13, 14, 15, 17, 18, 20, 21, and 23).
11. Close the 12-inch clearwell isolation valve (Valve ID No. 24) and the chlorine solution solenoid valve (Valve ID No. 25). Verify all filter effluent valves are closed (Valve ID No. 16, 19, and 22).

3.11 Maintenance Activities and Troubleshooting

Table 4 shows the standard maintenance activities and their frequency for the slow sand filtration plant. Please see individual equipment/instrumentation Operation and Maintenance Manuals for complete maintenance schedules and troubleshooting guides. The primary periodic maintenance activity is resanding.

TABLE 4
Standard Maintenance Activities

Item	Activity	Frequency
Filter	Scrape	As necessary, may be 0.5 to 12 months
Instrumentation	Calibrate	Monthly
Pumps	Check Grease Lubricated Bearings	Quarterly
	Check Pump/Motor Alignment	Semiannually
	Inspect Pump Casing Internally and Rotating Assembly for Excessive Wear	Annually
Presedimentation Pond Cells	Scrape	As necessary, may be yearly

Appendix C- Water Quality Regulations and Secondary Standards Data

Includes Secondary Standards Data from City of Douglas as well as UCRM5 testing results from the EPA

Little Box Elder Spring Secondary Standards					
Parameter	Surr: 1,2 - Dichloroethane - d4	Surr: Dibromofluoromethane	Surr: p - Bromofluorobenzene	Surr: Toluene - d8	Surr: 2, 4 - Dichlorophenylacetic Acid
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	95.00000	107.00000	102.00000	98.00000	96.00000
Max	115.00000	107.00000	124.00000	110.00000	110.00000
Average	103.00000	---	112.00000	104.33333	102.28571
Parameter	Surr: 1,1,1,2 - Tetrachloroethane	Surr: 1,3 - Dimethyl - 2 - nitrobenzene	Surr: Perylene - d12	Surr: Pyrene - d12	Surr: Triphenylphosphate
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	98.00000	92.00000	77.00000	95.00000	92.00000
Max	108.00000	106.00000	97.00000	104.00000	112.00000
Average	101.66667	101.14286	89.42857	98.85714	104.42857
Parameter	Surr: BDMC	Surr: 2,4 - Dichlorophenylacetic acid	pH, field	Temperature F, field	Fluoride
Unit	%REC	%REC	s.u.	F	mg/L
Maximum Contaminant Level	**100**	**100**	**6.5-8.5**	**50-72**	**4**
Min	74.00000	77.00000	7.70000	62.60000	0.20000
Max	113.00000	104.00000	7.70000	62.60000	0.30000
Average	98.00000	97.14286	7.70000	62.60000	0.25000

Parameter	1068 Acidity, Total as CaCO3	1927 Alkalinity, Total as CaCO3	1029 Carbonate as CO3	Chloride	1925 pH
Unit	mg/L	mg/L	mg/L	mg/L	s.u.
Maximum Contaminant Level			**30-400**	**250**	**6.5-8.5**
Min	-184.00000	199.00000	4.00000	5.00000	7.73000
Max	-78.00000	208.00000	4.00000	6.00000	7.80000
Average	-122.33333	203.25000	4.00000	5.25000	7.77667
Parameter	Sulfate	1920 Odor	1064 Conductivity @ 25 C	1918 Hardness as CaCO3	1016 Calcium
Unit	mg/L	T.O.N.	umhos/cm	mg/L	mg/L
Maximum Contaminant Level	**250**		**800**	**300**	**100**
Min	35.00000	2.00000	450.00000	229.00000	57.00000
Max	45.00000	3.00000	473.00000	247.00000	62.00000
Average	38.75000	2.66667	461.75000	240.33333	60.00000
Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1002 Aluminum	1010 Barium	1079 Boron	1049 Silica
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**2.9**	**2**	**0.6**	**N/A**
Min	267.00000	---	0.09000	---	19.50000
Max	295.00000	0.04000	0.10000	---	20.60000
Average	277.00000	---	0.09667	---	20.13333

Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1031 Magnesium	1042 Potassium	1045 Selenium	1052 Sodium
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**50**	**200**	**0.05**	**20**
Min	288.00000	21.00000	3.00000	---	9.00000
Max	288.00000	23.00000	3.00000	---	10.00000
Average	288.00000	22.33333	3.00000	---	9.33333

--- Indicates a Non-Detection Reading

Sheep Mountain Well Secondary Standards					
Parameter	Surr: 1,2 - Dichloroethane - d4	Surr: Dibromofluoromethane	Surr: p - Bromofluorobenzene	Surr: Toluene - d8	Surr: 2, 4 - Dichlorophenylacetic Acid
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	94	108	104	103	97
Max	114	108	128	111	117
Average	101.66667	---	113.33333	106.66667	103
Parameter	Surr: 1,1,1,2 - Tetrachloroethane	Surr: 1,3 - Dimethyl - 2 -nitrobenzene	Surr: Perylene - d12	Surr: Pyrene - d12	Surr: Triphenylphosphate
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	83	93	78	95	100
Max	106	105	103	109	117
Average	93	100.42857	93.28571	100.85714	108.71429
Parameter	Surr: BDMC	Surr: 2,4 - Dichlorophenylacetic acid	pH, field	Temperature F, field	Fluoride
Unit	%REC	%REC	s.u.	F	mg/L
Maximum Contaminant Level	**100**	**100**	**6.5-8.5**	**50-72**	**4**
Min	88	93	7.63	61.6	0.5
Max	110	107	7.63	61.6	0.6

Average	99.16667	101.14286	7.63	61.6	0.525
Parameter	1068 Acidity, Total as CaCO3	1927 Alkalinity, Total as CaCO3	1029 Carbonate as CO3	Chloride	1925 pH
Unit	mg/L	mg/L	mg/L	mg/L	s.u.
Maximum Contaminant Level			**30-400**	**250**	**6.5-8.5**
Min	-158	176	---	11	7.62
Max	-65	179	---	12	7.7
Average	-100.33333	178.25	---	11.25	7.665
Parameter	Sulfate	1920 Odor	1064 Conductivity @ 25 C	1918 Hardness as CaCO3	1016 Calcium
Unit	mg/L	T.O.N.	umhos/cm	mg/L	mg/L
Maximum Contaminant Level	**250**		**800**	**300**	**100**
Min	76	3	514	225	56
Max	83	6	530	241	60
Average	79.25	4	523.25	234.66667	58.33333
Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1002 Aluminum	1010 Barium	1079 Boron	1049 Silica
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**2.9**	**2**	**0.6**	**N/A**
Min	---	0.04	0.06	0.05	18.8
Max	---	0.04	0.06	0.05	20.4

Average	---	0.04	0.06	0.05	19.76667
Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1031 Magnesium	1042 Potassium	1045 Selenium	1052 Sodium
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**50**	**200**	**0.05**	**20**
Min	321	21	5	0.002	22
Max	340	22	5	0.002	24
Average	331.75	21.66667	5	0.002	23
--- Indicates a Non-Detection Reading					

Douglas Water Treatment Plant Secondary Standards					
Parameter	Surr: 1,2 - Dichloroethane - d4	Surr: Dibromofluoromethane	Surr: p - Bromofluorobenzene	Surr: Toluene - d8	Surr: 2, 4 - Dichlorophenylacetic Acid
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	99.00000	120.00000	102.00000	106.00000	96.00000
Max	118.00000	120.00000	127.00000	116.00000	112.00000
Average	106.75000	---	110.25000	110.25000	102.16667
Parameter	Surr: 1,1,1,2 - Tetrachloroethane	Surr: 1,3 - Dimethyl - 2 - nitrobenzene	Surr: Perylene - d12	Surr: Pyrene - d12	Surr: Triphenylphosphate
Unit	%REC	%REC	%REC	%REC	%REC
Maximum Contaminant Level	**100**	**100**	**100**	**100**	**100**
Min	98.00000	92.00000	77.00000	95.00000	92.00000
Max	104.00000	106.00000	107.00000	106.00000	121.00000
Average	98.00000	97.83333	95.00000	96.16667	112.66667

Parameter	Surr: BDMC	Surr: 2,4 - Dichlorophenylacetic acid	pH, field	Temperature F, field	Fluoride
Unit	%REC	%REC	s.u.	F	mg/L
Maximum Contaminant Level	**100**	**100**	**6.5-8.5**	**50-72**	**4**
Min	74.00000	77.00000	7.70000	57.10000	0.30000
Max	114.00000	101.00000	7.70000	57.10000	0.40000
Average	102.33333	94.00000	7.70000	57.10000	0.36667
Parameter	1068 Acidity, Total as CaCO3	1927 Alkalinity, Total as CaCO3	1029 Carbonate as CO3	Chloride	1925 pH
Unit	mg/L	mg/L	mg/L	mg/L	s.u.
Maximum Contaminant Level			**30-400**	**250**	**6.5-8.5**
Min	-50.00000	122.00000	---	10.00000	7.70000
Max	-40.00000	131.00000	---	11.00000	7.84000
Average	-45.00000	125.66667	---	10.66667	7.78000

Parameter	Sulfate	1920 Odor	1064 Conductivity @ 25 C	1918 Hardness as CaCO3	1016 Calcium
Unit	mg/L	T.O.N.	umhos/cm	mg/L	mg/L
Maximum Contaminant Level	**250**		**800**	**300**	**100**
Min	102.00000	2.00000	467.00000	181.00000	46.00000
Max	117.00000	8.00000	512.00000	199.00000	51.00000
Average	108.33333	4.00000	494.33333	190.00000	48.50000
Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1002 Aluminum	1010 Barium	1079 Boron	1049 Silica
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**2.9**	**2**	**0.6**	**N/A**
Min	297.00000	0.04000	---	0.06000	7.30000
Max	324.00000	0.04000	---	0.06000	7.50000
Average	310.00000	0.04000	---	0.06000	7.40000

Parameter	1930 Solids, Total Dissolved TDS @ 180 C	1031 Magnesium	1042 Potassium	1045 Selenium	1052 Sodium
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Maximum Contaminant Level	**500**	**50**	**200**	**0.05**	**20**
Min	310.00000	16.00000	3.00000	0.00200	33.00000
Max	310.00000	17.00000	3.00000	0.00200	34.00000
Average	310.00000	16.50000	3.00000	0.00200	33.50000

--- Indicates a Non-Detection Reading

Fifth Unregulated Contaminant Monitoring Rule Results

Contaminant	MRL	Units	SMW Result	WTP Result	LBES Result
11Cl-PF3OUdS	0.005	µg/L	Not Detected	Not Detected	Not Detected
4:2 FTS	0.003	µg/L	Not Detected	Not Detected	Not Detected
6:2 FTS	0.005	µg/L	Not Detected	Not Detected	Not Detected
8:2 FTS	0.005	µg/L	Not Detected	Not Detected	Not Detected
9Cl-PF3ONS	0.002	µg/L	Not Detected	Not Detected	Not Detected
ADONA	0.003	µg/L	Not Detected	Not Detected	Not Detected
HFPO-DA	0.005	µg/L	Not Detected	Not Detected	Not Detected
lithium	9	µg/L	29.7	25.3	13
NEtFOSAA	0.005	µg/L	Not Detected	Not Detected	Not Detected
NFDHA	0.02	µg/L	Not Detected	Not Detected	Not Detected
NMeFOSAA	0.006	µg/L	Not Detected	Not Detected	Not Detected
PFBA	0.005	µg/L	Not Detected	0.007	Not Detected
PFBS	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFDA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFDoA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFEESA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFHpA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFHpS	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFHxA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFHxS	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFMBA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFMPA	0.004	µg/L	Not Detected	Not Detected	Not Detected
PFNA	0.004	µg/L	Not Detected	Not Detected	Not Detected
PFOA	0.004	µg/L	Not Detected	Not Detected	Not Detected
PFOS	0.004	µg/L	Not Detected	Not Detected	Not Detected
PFPeA	0.003	µg/L	Not Detected	Not Detected	Not Detected
PFPeS	0.004	µg/L	Not Detected	Not Detected	Not Detected
PFTA	0.008	µg/L	Not Detected	Not Detected	Not Detected
PFTrDA	0.007	µg/L	Not Detected	Not Detected	Not Detected
PFUnA	0.002	µg/L	Not Detected	Not Detected	Not Detected

Appendix D- PRRIP Reports

Includes PRRIP Reports to the State Engineer's Office from 2011 Water Year to 2022 Water Year

Diversions and Deliveries into Supply and Irrigation

Water Year	Month	Surface Water Diversions into Supply	Groundwater Deliveries into Supply	Surface Water Diversions into Irrigation	Groundwater Deliveries into Irrigation
2011	January	0.00	26.80	0.00	0.00
2011	February	0.00	25.60	0.00	0.00
2011	March	0.00	29.10	0.00	0.00
2011	April	0.00	38.10	0.00	0.00
2011	May	0.00	69.60	0.00	0.00
2011	June	10.50	73.80	20.80	0.00
2011	July	23.50	73.20	17.00	0.00
2011	August	20.90	73.60	20.90	0.00
2011	September	11.60	60.60	11.70	0.00
2012	October	0.00	38.00	6.30	0.00
2012	November	0.00	25.80	0.03	0.00
2012	December	0.00	28.90	0.00	0.00
2012	January	0.00	29.20	0.00	0.00
2012	February	0.00	25.90	0.00	0.00
2012	March	0.00	29.30	0.00	0.00
2012	April	0.00	30.20	2.10	0.00
2012	May	0.00	51.40	3.60	0.00
2012	June	0.00	78.10	7.90	0.00
2012	July	15.60	83.20	19.80	0.00
2012	August	18.50	72.20	8.90	0.00
2012	September	5.10	59.70	10.20	0.00
2013	October	0.00	27.30	0.00	0.00
2013	November	0.00	21.60	0.00	0.00
2013	December	0.00	24.90	0.00	0.00
2013	January	0.00	31.70	0.00	0.00

2013	February	0.00	27.00	0.00	0.00
2013	March	0.00	27.20	0.00	0.00
2013	April	0.00	28.70	0.00	0.00
2013	May	0.00	41.40	3.30	0.00
2013	June	0.00	73.80	7.50	0.00
2013	July	8.50	88.40	12.90	0.00
2013	August	7.60	65.20	11.40	0.00
2013	September	11.40	46.30	11.30	0.00
2014	October	0.00	40.90	7.60	0.00
2014	November	0.00	31.00	11.10	0.00
2014	December	0.00	23.50	0.00	0.00
2014	January	0.00	33.60	0.00	0.00
2014	February	0.00	20.10	0.00	0.00
2014	March	0.00	28.70	0.00	0.00
2014	April	0.00	29.20	0.00	0.00
2014	May	0.00	31.50	0.00	0.00
2014	June	0.00	50.40	0.38	0.00
2014	July	1.90	116.80	0.83	0.00
2014	August	19.10	72.80	1.20	0.00
2014	September	17.50	51.40	0.44	0.00
2015	October	0.00	44.50	0.09	0.00
2015	November	0.00	26.60	0.00	0.00
2015	December	0.00	25.60	0.00	0.00
2015	January	0.00	22.90	0.00	0.00
2015	February	0.00	24.50	0.00	0.00
2015	March	0.00	22.30	0.00	0.00
2015	April	0.00	26.00	0.00	0.00
2015	May	0.00	32.50	24.50	0.00
2015	June	0.00	93.10	15.00	0.00
2015	July	15.90	90.20	12.50	0.00

2015	August	9.20	87.30	7.20	0.00
2015	September	5.30	53.60	12.50	0.00
2016	October	0.00	33.50	0.09	0.00
2016	November	0.00	28.60	0.00	0.00
2016	December	0.00	27.80	0.00	0.00
2016	January	0.00	27.60	0.00	0.00
2016	February	0.00	22.30	0.00	0.00
2016	March	0.00	25.10	0.00	0.00
2016	April	0.00	23.90	0.00	0.00
2016	May	0.00	32.10	0.00	0.00
2016	June	0.00	63.80	0.94	0.00
2016	July	3.59	85.10	1.63	0.00
2016	August	0.00	71.20	0.93	0.00
2016	September	0.33	58.20	0.60	0.00
2017	October	0.00	3.38	0.00	0.00
2017	November	0.00	28.08	0.00	0.00
2017	December	0.00	29.02	0.00	0.00
2017	January	0.00	29.00	0.00	0.00
2017	February	0.00	26.13	0.00	0.00
2017	March	0.00	28.85	0.00	0.00
2017	April	0.00	25.53	0.00	0.00
2017	May	0.00	33.46	0.00	0.00
2017	June	0.00	57.64	0.35	0.00
2017	July	0.00	75.27	1.12	0.00
2017	August	0.00	72.97	0.71	0.00
2017	September	0.00	63.24	0.50	0.00
2018	October	0.00	32.81	0.00	0.00
2018	November	0.00	29.10	0.00	0.00
2018	December	0.00	29.11	0.00	0.00
2018	January	0.00	26.79	0.00	0.00

2018	February	0.00	24.42	0.00	0.00
2018	March	0.00	26.98	0.00	0.00
2018	April	0.00	26.34	0.00	0.00
2018	May	0.00	29.28	0.00	0.00
2018	June	0.00	55.75	10.21	0.00
2018	July	0.00	81.98	10.62	0.00
2018	August	11.30	69.57	10.28	0.00
2018	September	4.94	57.40	19.88	0.00
2019	October	0.00	32.45	0.00	0.00
2019	November	0.00	27.00	0.00	0.00
2019	December	0.00	27.90	0.00	0.00
2019	January	0.00	27.90	0.00	0.00
2019	February	0.00	26.10	0.00	0.00
2019	March	0.00	27.82	0.00	0.00
2019	April	0.00	28.70	0.00	0.00
2019	May	0.00	51.24	0.00	0.00
2019	June	0.00	80.51	0.00	0.00
2019	July	4.39	94.65	0.11	0.00
2019	August	18.74	73.67	0.66	0.00
2019	September	4.58	0.00	0.38	0.00
2020	October	0.00	42.35	0.00	0.00
2020	November	0.00	23.29	0.00	0.00
2020	December	0.00	23.89	0.00	0.00
2020	January	0.00	23.95	0.00	0.00
2020	February	0.00	22.69	0.00	0.00
2020	March	0.00	25.29	0.00	0.00
2020	April	0.00	26.17	0.00	0.00
2020	May	0.00	37.80	0.00	0.00
2020	June	0.00	83.76	0.14	0.00
2020	July	9.13	80.98	0.03	0.00

2020	August	7.13	75.12	0.00	0.00
2020	September	5.11	50.99	0.00	0.00
2021	October	0.00	33.41	0.03	0.00
2021	November	0.00	25.98	0.00	0.00
2021	December	0.00	24.91	0.00	0.00
2021	January	0.00	25.34	0.00	0.00
2021	February	0.00	25.09	0.00	0.00
2021	March	0.00	26.03	0.00	0.00
2021	April	0.00	26.38	0.00	0.00
2021	May	0.00	43.73	13.61	0.00
2021	June	3.34	69.62	13.19	0.00
2021	July	18.05	75.89	13.67	0.00
2021	August	10.94	75.02	13.80	0.00
2021	September	7.27	58.74	13.40	0.00
2022	October	0.00	35.83	0.00	0.00
2022	November	0.00	26.38	0.00	0.00
2022	December	0.00	28.54	0.00	0.00
2022	January	0.00	27.78	0.00	0.00
2022	February	0.00	23.44	0.00	0.00
2022	March	0.00	26.91	0.00	0.00
2022	April	0.00	25.67	0.00	0.00
2022	May	0.00	40.19	1.35	0.00
2022	June	0.00	47.29	3.36	0.00
2022	July	0.00	76.15	10.11	0.00
2022	August	6.12	61.23	9.91	0.00
2022	September	4.23	54.71	10.08	0.00

Effluent and Sale Water

Water Year	Month	Measured Effluent Through WWTF	Surface Water Sales	Groundwater Sales	Wastewater Treated from Water Sales	Wastewater Treated from Non- Municipal Water Supplies
2011	January	20.60	0.00	0.89	0.00	0.00
2011	February	19.30	0.00	0.75	0.00	0.00
2011	March	19.60	0.00	0.83	0.00	0.00
2011	April	18.20	0.00	0.71	0.00	0.00
2011	May	18.40	0.00	0.71	0.00	0.00
2011	June	19.10	0.81	0.81	0.00	0.00
2011	July	19.60	1.18	1.18	0.00	0.00
2011	August	20.10	1.01	1.01	0.00	0.00
2011	September	18.30	0.90	0.90	0.00	0.00
2012	October	19.50	0.00	1.20	0.00	0.00
2012	November	19.00	0.00	0.96	0.00	0.00
2012	December	19.00	0.00	1.60	0.00	0.00
2012	January	18.90	0.00	1.70	0.00	0.00
2012	February	16.90	0.00	2.90	0.00	0.00
2012	March	17.90	0.00	1.20	0.00	0.00
2012	April	18.40	0.00	4.80	0.00	0.00
2012	May	19.30	0.00	1.90	0.00	0.00
2012	June	18.90	0.00	1.00	0.00	0.00
2012	July	18.70	0.77	0.77	0.00	0.00
2012	August	20.20	0.71	0.71	0.00	0.00
2012	September	18.90	0.98	0.98	0.00	0.00
2013	October	20.60	0.00	1.1.	0.00	0.00
2013	November	19.10	0.00	0.90	0.00	0.00
2013	December	18.90	0.00	1.10	0.00	0.00
2013	January	19.60	0.00	1.00	0.00	0.00

2013	February	18.50	0.00	0.90	0.00	0.00
2013	March	19.30	0.00	702.00	0.00	0.00
2013	April	19.10	0.00	0.60	0.00	0.00
2013	May	21.20	0.00	0.70	0.00	0.00
2013	June	20.20	0.00	0.90	0.00	0.00
2013	July	20.80	1.70	1.70	0.00	0.00
2013	August	21.50	0.90	0.90	0.00	0.00
2013	September	20.60	1.30	1.30	0.00	0.00
2014	October	21.00	0.00	1.40	0.00	0.00
2014	November	20.10	0.00	0.94	0.00	0.00
2014	December	19.00	0.00	0.72	0.00	0.00
2014	January	20.00	0.00	0.50	0.00	0.00
2014	February	16.80	0.00	0.29	0.00	0.00
2014	March	18.50	0.00	0.29	0.00	0.00
2014	April	19.00	0.00	0.31	0.00	0.00
2014	May	22.00	0.00	0.22	0.00	0.00
2014	June	21.10	0.00	0.36	0.00	0.00
2014	July	19.60	0.49	0.49	0.00	0.00
2014	August	19.70	0.56	0.56	0.00	0.00
2014	September	18.20	0.63	0.63	0.00	0.00
2015	October	19.60	0.00	0.25	0.00	0.00
2015	November	18.80	0.00	0.19	0.00	0.00
2015	December	19.30	0.00	0.17	0.00	0.00
2015	January	18.40	0.00	0.07	0.00	0.00
2015	February	17.00	0.00	0.09	0.00	0.00
2015	March	17.50	0.00	0.14	0.00	0.00
2015	April	17.60	0.00	0.14	0.00	0.00
2015	May	19.30	0.00	0.26	0.00	0.00
2015	June	17.10	0.00	0.41	0.00	0.00
2015	July	16.90	0.25	0.25	0.00	0.00

2015	August	18.30	0.35	0.35	0.00	0.00
2015	September	16.90	0.18	0.18	0.00	0.00
2016	October	16.90	0.15	0.15	0.00	0.00
2016	November	17.20	0.00	0.15	0.00	0.00
2016	December	17.90	0.00	0.18	0.00	0.00
2016	January	17.70	0.00	0.29	0.00	0.00
2016	February	16.20	0.00	0.22	0.00	0.00
2016	March	17.70	0.00	0.36	0.00	0.00
2016	April	18.30	0.00	0.08	0.00	0.00
2016	May	19.80	0.00	0.44	0.00	0.00
2016	June	17.60	0.45	0.45	0.00	0.00
2016	July	17.60	0.58	0.58	0.00	0.00
2016	August	19.40	0.39	0.39	0.00	0.00
2016	September	18.10	0.74	0.74	0.00	0.00
2017	October	18.60	0.00	0.74	0.00	0.00
2017	November	17.36	0.00	1.04	0.00	0.00
2017	December	17.63	0.00	0.73	0.00	0.00
2017	January	19.21	0.00	0.65	0.00	0.00
2017	February	16.85	0.00	0.61	0.00	0.00
2017	March	18.88	0.00	0.91	0.00	0.00
2017	April	17.60	0.00	0.82	0.00	0.00
2017	May	20.85	0.00	0.89	0.00	0.00
2017	June	21.00	0.00	0.86	0.00	0.00
2017	July	20.40	0.00	0.75	0.00	0.00
2017	August	20.56	0.00	0.83	0.00	0.00
2017	September	18.15	0.00	0.92	0.00	0.00
2018	October	19.70	0.00	1.15	0.00	0.00
2018	November	19.74	0.00	0.96	0.00	0.00
2018	December	18.39	0.00	0.96	0.00	0.00
2018	January	18.72	0.00	1.36	0.00	0.00

2018	February	17.60	0.00	1.21	0.00	0.00
2018	March	20.03	0.00	1.31	0.00	0.00
2018	April	18.19	0.00	1.39	0.00	0.00
2018	May	21.02	0.00	1.28	0.00	0.00
2018	June	19.76	0.00	1.49	0.00	0.00
2018	July	20.09	0.00	1.53	0.00	0.00
2018	August	21.25	1.49	1.49	0.00	0.00
2018	September	19.70	1.37	1.37	0.00	0.00
2019	October	21.28	0.00	0.00	0.00	0.00
2019	November	20.78	0.00	1.72	0.00	0.00
2019	December	20.22	0.00	1.16	0.00	0.00
2019	January	19.91	0.00	1.07	0.00	0.00
2019	February	19.23	0.00	1.14	0.00	0.00
2019	March	20.33	0.00	0.96	0.00	0.00
2019	April	18.78	0.00	0.88	0.00	0.00
2019	May	18.08	0.00	0.67	0.00	0.00
2019	June	17.42	0.00	0.86	0.00	0.00
2019	July	15.86	1.15	0.00	0.00	0.00
2019	August	18.41	1.20	0.00	0.00	0.00
2019	September	18.56	0.72	0.00	0.00	0.00
2020	October	18.38	0.00	0.56	0.00	0.00
2020	November	13.79	0.00	0.24	0.00	0.00
2020	December	14.88	0.00	0.24	0.00	0.00
2020	January	15.97	0.00	0.22	0.00	0.00
2020	February	14.38	0.00	0.41	0.00	0.00
2020	March	17.02	0.00	0.30	0.00	0.00
2020	April	15.96	0.00	0.49	0.00	0.00
2020	May	15.84	0.00	1.60	0.00	0.00
2020	June	15.60	0.00	0.56	0.00	0.00
2020	July	16.37	0.56	0.00	0.00	0.00

2020	August	16.81	0.78	0.00	0.00	0.00
2020	September	15.75	0.60	0.00	0.00	0.00
2021	October	17.92	0.00	0.67	0.00	0.00
2021	November	16.08	0.00	0.72	0.00	0.00
2021	December	16.10	0.00	0.57	0.00	0.00
2021	January	16.00	0.00	0.46	0.00	0.00
2021	February	14.93	0.00	0.50	0.00	0.00
2021	March	16.21	0.00	0.38	0.00	0.00
2021	April	16.22	0.00	0.43	0.00	0.00
2021	May	16.94	0.00	0.65	0.00	0.00
2021	June	16.03	0.67	0.00	0.00	0.00
2021	July	15.80	0.72	0.00	0.00	0.00
2021	August	16.97	0.71	0.00	0.00	0.00
2021	September	15.37	0.66	0.00	0.00	0.00
2022	October	15.39	0.00	0.63	0.00	0.00
2022	November	14.99	0.00	0.74	0.00	0.00
2022	December	16.00	0.00	0.52	0.00	0.00
2022	January	16.68	0.00	0.36	0.00	0.00
2022	February	15.39	0.00	0.19	0.00	0.00
2022	March	16.64	0.00	0.28	0.00	0.00
2022	April	16.36	0.00	0.18	0.00	0.00
2022	May	18.12	0.00	0.18	0.00	0.00
2022	June	16.11	0.00	0.35	0.00	0.00
2022	July	16.83	0.00	0.39	0.00	0.00
2022	August	17.78	0.47	0.00	0.00	0.00
2022	September	15.60	0.39	0.00	0.00	0.00

Purchased, Temporary Use, and Non-Hydrologically Connected Waters

Water Year	Month	Diversions from Purchase of Storage Water	Diversions from Transfers or Temporary Use of Surface Water	Diversions from Probable Non-Hydrologically Connected Source	Diversions from Transfers or Temporary Use of Groundwater
2011	January	0.00	0.00	0.00	0.00
2011	February	0.00	0.00	0.00	0.00
2011	March	0.00	0.00	0.00	0.00
2011	April	0.00	0.00	0.00	0.00
2011	May	0.00	0.00	19.90	0.00
2011	June	0.00	0.00	30.70	0.00
2011	July	0.00	0.00	28.60	0.00
2011	August	0.00	0.00	30.00	0.00
2011	September	0.00	0.00	21.70	0.00
2012	October	0.00	0.00	7.50	0.00
2012	November	0.00	0.00	0.00	0.00
2012	December	0.00	0.00	0.00	0.00
2012	January	0.00	0.00	0.00	0.00
2012	February	0.00	0.00	0.00	0.00
2012	March	0.00	0.00	0.00	0.00
2012	April	0.00	0.00	0.00	0.00
2012	May	0.00	0.00	7.20	0.00
2012	June	0.00	0.00	34.90	0.00
2012	July	0.00	0.00	38.60	0.00
2012	August	0.00	0.00	28.90	0.00
2012	September	0.00	0.00	20.20	0.00
2013	October	0.00	0.00	0.00	0.00
2013	November	0.00	0.00	0.00	0.00
2013	December	0.00	0.00	0.00	0.00

2013	January	0.00	0.00	0.00	0.00
2013	February	0.00	0.00	0.00	0.00
2013	March	0.00	0.00	0.00	0.00
2013	April	0.00	0.00	0.00	0.00
2013	May	0.00	0.00	0.80	0.00
2013	June	0.00	0.00	22.90	0.00
2013	July	0.00	0.00	26.80	0.00
2013	August	0.00	0.00	20.30	0.00
2013	September	0.00	0.00	7.40	0.00
2014	October	0.00	0.00	1.40	0.00
2014	November	0.00	0.00	0.00	0.00
2014	December	0.00	0.00	0.00	0.00
2014	January	0.00	0.00	0.00	0.00
2014	February	0.00	0.00	0.00	0.00
2014	March	0.00	0.00	0.00	0.00
2014	April	0.00	0.00	6.70	0.00
2014	May	0.00	0.00	9.30	0.00
2014	June	0.00	0.00	12.40	0.00
2014	July	0.00	0.00	30.50	0.00
2014	August	0.00	0.00	14.70	0.00
2014	September	0.00	0.00	6.30	0.00
2015	October	0.00	0.00	1.40	0.00
2015	November	0.00	0.00	0.00	0.00
2015	December	0.00	0.00	0.00	0.00
2015	January	0.00	0.00	0.00	0.00
2015	February	0.00	0.00	0.00	0.00
2015	March	0.00	0.00	0.00	0.00
2015	April	0.00	0.00	0.00	0.00
2015	May	0.00	0.00	0.00	0.00
2015	June	0.00	0.00	38.80	0.00

2015	July	0.00	0.00	23.30	0.00
2015	August	0.00	0.00	21.30	0.00
2015	September	0.00	0.00	8.50	0.00
2016	October	0.00	0.00	0.16	0.00
2016	November	0.00	0.00	0.00	0.00
2016	December	0.00	0.00	0.00	0.00
2016	January	0.00	0.00	0.00	0.00
2016	February	0.00	0.00	0.00	0.00
2016	March	0.00	0.00	0.00	0.00
2016	April	0.00	0.00	0.00	0.00
2016	May	0.00	0.00	0.00	0.00
2016	June	0.00	0.00	17.20	0.00
2016	July	0.00	0.00	32.60	0.00
2016	August	0.00	0.00	17.60	0.00
2016	September	0.00	0.00	7.90	0.00
2017	October	0.00	0.00	0.00	0.00
2017	November	0.00	0.00	0.00	0.00
2017	December	0.00	0.00	0.00	0.00
2017	January	0.00	0.00	0.00	0.00
2017	February	0.00	0.00	0.00	0.00
2017	March	0.00	0.00	0.00	0.00
2017	April	0.00	0.00	0.00	0.00
2017	May	0.00	0.00	0.00	0.00
2017	June	0.00	0.00	12.13	0.00
2017	July	0.00	0.00	22.93	0.00
2017	August	0.00	0.00	20.12	0.00
2017	September	0.00	0.00	12.64	0.00
2018	October	0.00	0.00	0.71	0.00
2018	November	0.00	0.00	0.00	0.00
2018	December	0.00	0.00	0.00	0.00

2018	January	0.00	0.00	0.00	0.00
2018	February	0.00	0.00	0.00	0.00
2018	March	0.00	0.00	0.00	0.00
2018	April	0.00	0.00	0.00	0.00
2018	May	0.00	0.00	0.01	0.00
2018	June	0.00	0.00	7.55	0.00
2018	July	0.00	0.00	28.46	0.00
2018	August	0.00	0.00	19.97	0.00
2018	September	0.00	0.00	11.40	0.00
2019	October	0.00	0.00	1.34	0.00
2019	November	0.00	0.00	0.00	0.00
2019	December	0.00	0.00	0.00	0.00
2019	January	0.00	0.00	0.00	0.00
2019	February	0.00	0.00	0.00	0.00
2019	March	0.00	0.00	0.00	0.00
2019	April	0.00	0.00	0.00	0.00
2019	May	0.00	0.00	6.34	0.00
2019	June	0.00	0.00	25.45	0.00
2019	July	0.00	0.00	37.46	0.00
2019	August	0.00	0.00	17.71	0.00
2019	September	0.00	0.00	7.02	0.00
2020	October	0.00	0.00	2.56	0.00
2020	November	0.00	0.00	1.70	0.00
2020	December	0.00	0.00	0.00	0.00
2020	January	0.00	0.00	0.00	0.00
2020	February	0.00	0.00	0.00	0.00
2020	March	0.00	0.00	0.00	0.00
2020	April	0.00	0.00	0.00	0.00
2020	May	0.00	0.00	1.45	0.00
2020	June	0.00	0.00	26.96	0.00

2020	July	0.00	0.00	24.08	0.00
2020	August	0.00	0.00	20.03	0.00
2020	September	0.00	0.00	4.75	0.00
2021	October	0.00	0.00	0.25	0.00
2021	November	0.00	0.00	0.00	0.00
2021	December	0.00	0.00	0.00	0.00
2021	January	0.00	0.00	0.00	0.00
2021	February	0.00	0.00	0.00	0.00
2021	March	0.00	0.00	0.00	0.00
2021	April	0.00	0.00	0.00	0.00
2021	May	0.00	0.00	3.34	0.00
2021	June	0.00	0.00	20.21	0.00
2021	July	0.00	0.00	22.62	0.00
2021	August	0.00	0.00	24.47	0.00
2021	September	0.00	0.00	11.71	0.00
2022	October	0.00	0.00	2.18	0.00
2022	November	0.00	0.00	0.00	0.00
2022	December	0.00	0.00	0.00	0.00
2022	January	0.00	0.00	0.00	0.00
2022	February	0.00	0.00	0.00	0.00
2022	March	0.00	0.00	0.00	0.00
2022	April	0.00	0.00	0.00	0.00
2022	May	0.00	0.00	0.00	0.00
2022	June	0.00	0.00	0.56	0.00
2022	July	0.00	0.00	4.21	0.00
2022	August	0.00	0.00	15.06	0.00
2022	September	0.00	0.00	6.70	0.00

Appendix E- Hydrogeology Supplements

Includes Hydrogeology information related to the Western Sky Well No. 1

Western Sky Well No. 1 Statement of Completion (UW6 Form)

FORM U.W.6
Rev. 1/07

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER
HERSCHLER BLDG., 4-E
CHEYENNE, WYOMING 82002

(307) 777-6163

STATEMENT OF COMPLETION AND DESCRIPTION OF WELL OR SPRING

NOTE: Do not fold this form. Use typewriter or print neatly with black pen.

PERMIT NO. U.W._____ NAME OF WELL/SPRING WESTERN SKY 1

1. NAME OF OWNER WESTERN CABLE LLC
2. ADDRESS P.O. BOX 386
   Please check if address has changed from that shown on permit
   City WRIGHT State WY Zip Code 82732 Phone No. 307-689-2813
3. USE OF WATER ☐ Domestic ☐ Stock Watering ☐ Irrigation ☐ Municipal ☐ Industrial ☒ Miscellaneous ☐ Monitor or Test ☐ Coal Bed Methane Explain proposed use (Example: One single family dwelling)
4. LOCATION OF WELL/SPRING SE 1/4 NW 1/4 of Section 26 T. 33 N., R. 71 W., of the 6th P.M. (or W.R.M.)
   Subdivision Name _____ Lot _____ Block _____
   Resurvey Location Tract _____ or Lot _____ Datum NAD27 NAD83
   Geographic Coordinates: Latitude 42° 48' 14.05" N Longitude 105° 20' 52.97" W (degrees, minutes, seconds)
   UTM Zone _____ Northing _____ Easting _____ (meters)
   State Plane Coordinates: Zone _____ Northing _____ Easting _____ (feet)
   Land surface elevation (ft. above mean sea level) 4960 Datum NAVD29 NAVD88
   Source GPS ☒ Map Survey Unkown Other Altimeter (for elevation only)
5. TYPE OF CONSTRUCTION ☐ Drilled DIRECT ROTARY ☐ Dug ☐ Driven ☐ Other
   Describe _____
6. CONSTRUCTION Total depth of well/spring 2,816 ft.
   Depth of static water level 220 ft. (below land surface) Casing height _____ ft. above ground
   a. Diameter of borehole (bit size) 14¾ inches to 1,200' and 7 -7/8" 1,200' to 2,816'
   b. Casing schedule ☒ New ☐ Used Joint type ☐ Threaded ☐ Glued ☐ Welded
   10¾ diameter from +2 ft. to 1200 ft. Material Steel Gage API J-55 405#/ft
   5½ diameter from 1176 ft. to 2676 ft. Material Steel Gage API J-55 17#/ft
   c. Cemented/grouted interval, from 1200 ft. to Surface ft.
   Amount of cement/grout used _____ (example: 10 sacks) type _____ (example: bentonite pellets)
   d. Type of completion ☒ Customized perforations ☐ Open hole ☒ Factory screen
   Type of perforator used 28 gram 4" slick guns (4 shots per foot)
   Size of perforations ½ inches by ½ inches.
   Number of perforations and depths where perforated
   120 perforations from 546 ft. to 576 ft. — 80 shots, 653' to 673'; 220 shots, 683' to 738'; 80 shots, 889' to 909'; 80 shots, 917' to 937'; 80 shots, 954' to 974'
   60 perforations from 596 ft. to 611 ft.
   Open hole from _____ ft. to _____ ft.
   Well screen details SEE ATTACHMENT
   Diameter _____ slot size _____ set from _____ ft. to _____ ft.
   Diameter _____ slot size _____ set from _____ ft. to _____ ft.
   e. Well development method Air Lift How long was well developed? 48 Hours
   f. Was a filter/gravel pack installed? ☐ Yes ☒ No Size of sand/gravel _____
   Filter/gravel pack installed from _____ ft. to _____ ft.
   g. Was surface casing used? ☒ Yes ☐ No Was it cemented in place? ☒ Yes ☐ No
   Surface casing installed from 0 ft. to 50 ft.
7. NAME AND ADDRESS OF DRILLING COMPANY Weston Engineering, P.O. Box 260, Upton, WY 82730
8. DATE OF COMPLETION OF WELL (including pump installation) OR SPRING (first used) August 18, 2013
9. PUMP INFORMATION Manufacturer Franklin F8STS275 Type Submersible
   Source of power Electric Horsepower 75 Depth of pump setting or intake 1070 ft.
   Amount of water being pumped 300 gal./min.* (For springs or flowing wells, see item 10)
   Total volumetric quantity used per calendar year.* 245 acre-feet
   *If these amounts exceed permitted amount an enlargement is required.
10. FLOWING WELL OR SPRING (Owner is responsible for control of flowing well)
    If artesian flow or spring, yield is _____ gal./min. *Surface pressure is _____ lb./sq.inch, or _____ feet of water.
    The flow is controlled by ☐ Valve ☐ Cap ☐ Plug
    Does well leak around casing? ☐ Yes ☐ No

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CHEYENNE, WYOMING

Permit No. U.W. _____ Book No. _____ Page No. _____

SEE REVERSE SIDE

11. IF SPRING, HOW WAS IT CONSTRUCTED? (Some method of artificial diversion, i.e., spring box, cribbing, etc., is necessary to qualify for a water right) _____

12. PUMP TEST Was a pump test conducted? ☐ Yes X No
If so, by whom _____
Yield _____ gal./min. with _____ ft. drawdown after _____ hours
Yield _____ gal./min. with _____ ft. drawdown after _____ hours

13. LOG OF WELL Total depth drilled 2816 ft.
Depth of completed well 2676 ft. Diameter of well 7-7/8 inches
Depth to first water bearing formation _____ ft.
Depth to principal water bearing formation Top 653 ft. to Bottom 2646 ft.

DRILL CUTTINGS DESCRIPTION

From Feet	To Feet	Rock Type or Description	Formation	Water Bearing? (Yes or no)
Surface		SEE ATTACHMENT		

14. DOES A GEOPHYSICAL LOG ACCOMPANY THIS FORM? Yes X No

15. QUALITY OF WATER INFORMATION

Does a chemical and/or bacteriological water quality analysis accompany this form? X Yes ☐ No
It is recommended that chemical and bacteriologic water quality analyses be performed and that the report(s) be filed with the records of this well (contact Department of Agriculture, Analytical Lab Services, Laramie, 742-2984).
If not, do you consider the water as ☐ Good ☐ Acceptable ☐ Poor ☐ Unusable

REMARKS Refiling for permit nos. 199368, 201420 and 205378

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct, and complete.

_____ 11-5 20 15
Signature of Owner or Authorized Agent Date

FOR STATE ENGINEER'S USE ONLY

Permit No. U.W. _____

Date of Receipt _____, 20____ Date of Approval _____, 20____

Date of Priority _____, 20____

_____
for State Engineer

WESTERN SKY 1, PERMIT U.W. 199368, CONSTRUCTION WELL SCREEN DETAILS

Diameter	Slot Size	Set from and to:
5 ½"	15	1372 ft. to 1382 ft.
5 ½"	15	1440 ft. to 1450 ft.
5 ½"	15	1476 ft. to 1486 ft.
5 ½"	15	1540 ft. to 1555 ft.
5 ½"	15	1790 ft. to 1830 ft.
5 ½"	15	1942 ft. to 1952 ft.
5 ½"	15	1996 ft. to 2016 ft.
5 ½"	15	2120 ft. to 2125 ft.
5 ½"	15	2430 ft. to 2460 ft.
5 ½"	15	2500 ft. to 2520 ft.
5 ½"	15	2584 ft. to 2604 ft.
5 ½"	15	2636 ft. to 2646 ft.

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CHEYENNE, WYOMING

WESTERN SKY 1, PERMIT U.W. 199368, DRILLING CUTTINGS

From Feet	To Feet	Rock Type or Description	Formation	Water Bearing?
0	525	Claystone, Mudstone, minor sands	Ft. Union	
525	614	Sand	Ft. Union	Yes
614	650	Claystone, Mudstone	Ft. Union	
650	740	Sand	Ft. Union	Yes
750	890	Claystone, Mudstone	Ft. Union	
890	978	Claystone, Mudstone w/ 10 to 20' Sands	Ft. Union	Yes
978	1312	Claystone, Mudstone	Ft. Union	
1312	1322	Coal	Ft. Union	
1322	1370	Claystone, Mudstone	Ft. Union	
1370	1382	Sand	Ft. Union	Yes
1382	1432	Claystone, Mudstone	Ft. Union	
1432	1450	Sand	Ft. Union	Yes
1450	1534	Claystone, Mudstone w/ minor sands	Ft. Union	
1534	1540	Coal	Ft. Union	
1540	1556	Sand	Ft. Union	Yes
1556	1638	Mudstone, Claystone w/ minor sand	Ft. Union	
1638	1642	Coal	Ft. Union	
1642	1716	Mudstone, Claystone	Ft. Union	
1716	1724	Coal	Ft. Union	
1724	1790	Mudstone, Claystone	Ft. Union	
1790	1830	Sand	Ft. Union	Yes
1830	1944	Mudstone, Claystone	Ft. Union	
1944	1976	Sand w/ 2 to 4' Claystone stringers	Ft. Union	
1976	2000	Claystone, Mudstone	Ft. Union	
2000	2016	Sand	Ft. Union	Yes
2016	2256	Claystone, Mudstone, thin Sand lenses	Ft. Union	
2256	2260	Coal	Ft. Union	
2260	2290	Claystone, Mudstone	Ft. Union	
2290	2294	Coal	Ft. Union	
2294	2344	Claystone, Mudstone	Ft. Union	
2344	2348	Coal	Ft. Union	
2348	2364	Claystone, Mudstone	Ft. Union	
2364	2370	Coal	Ft. Union	
2370	2430	Claystone, Mudstone	Ft. Union	
2430	2460	Sand	Ft. Union	Yes
2460	2502	Claystone, Mudstone	Ft. Union	
2502	2560	Sand	Ft. Union	Yes
2560	2584	Claystone, Mudstone	Ft. Union	
2584	2602	Sand	Ft. Union	Yes
2602	2636	Claystone, Mudstone	Ft. Union	
2636	2646	Sand	Ft. Union	Yes
2646	2816	Claystone, Mudstone w/ Coal	Lance	

Western Sky Well No. 1 Analysis

Completed by Forsgren Associates Inc.

FORSGREN Associates Inc.

January 21, 2025

City of Douglas
P.O. Box 1030
Douglas, Wyoming 82633

ATTN: J.D. Cox, City Manager
John Harbarger, Director of Public Works
Josh Oberlander, Water & Wastewater Treatment Supervisor

RE: Western Sky 1 Well Analysis

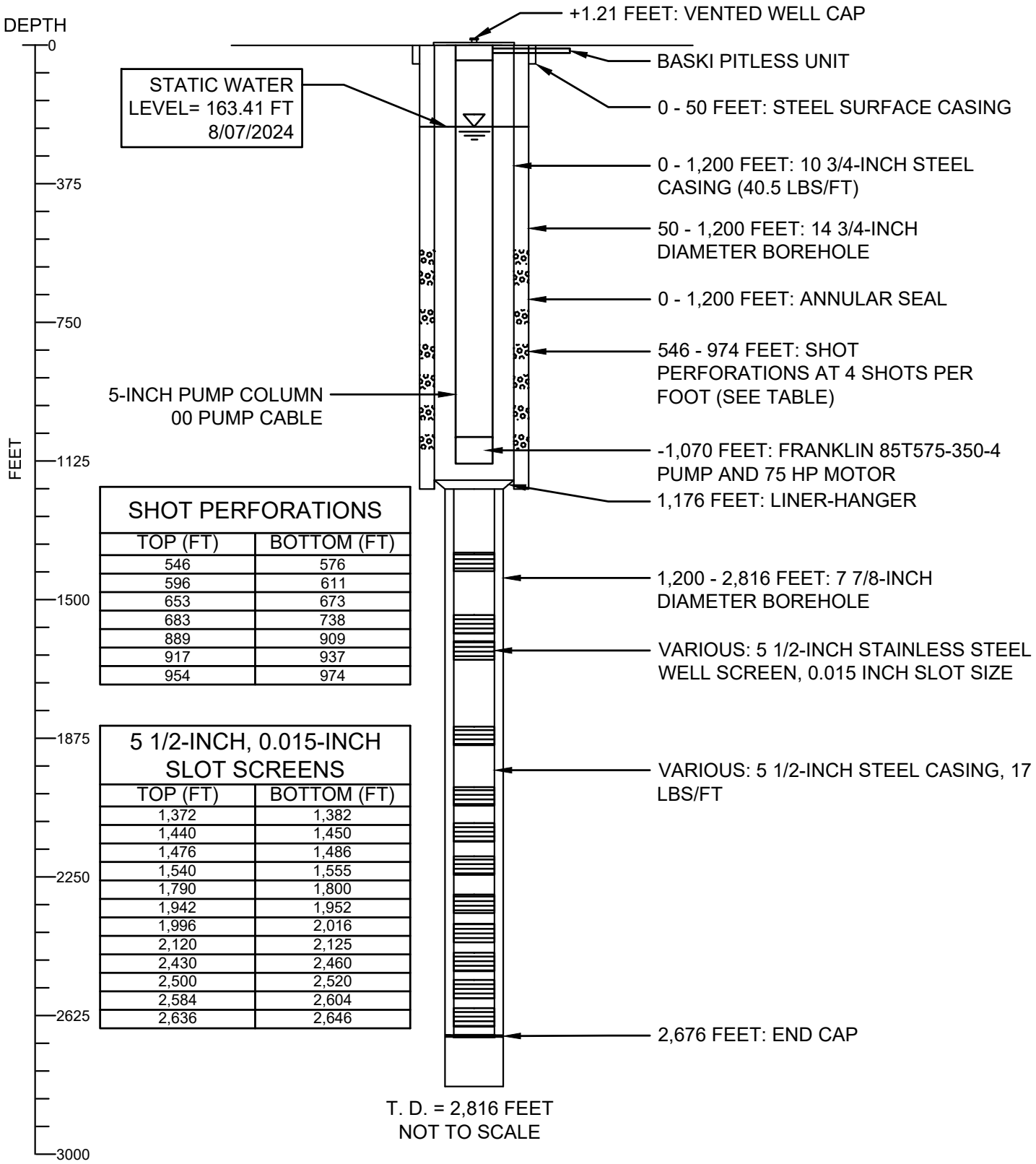
Dear J.D., John, and Josh:

This letter is submitted regarding the proposal from the owners of the Western Sky 1 well to sell the well to Douglas for $1,550,000, plus continued use of water from the well at a cost of one-half of the normal bulk rate for use at the existing truck wash. The letter is prepared to provide you with pertinent information regarding the well, including the results of pump testing and water quality samples. The letter also provides recommendations regarding future actions.

The Western Sky 1 well was constructed in 2013 in the Fort Union Formation by Weston Engineering. The owners of the well retained John Wetstein of Wester-Wetstein (now Engineering Associates) to design and supervise the construction of the well. Well construction details are provided in Table 1 and Figure 1 is an as-built diagram.

Permitting

The Western Sky 1 well was permitted with the Wyoming State Engineer's Office (SEO) for miscellaneous use related to water haul activities for oil and gas development. The original well permit was U.W. 199368 and had a priority date of December 27, 2010. The permitted instantaneous pumping rate was 300 gallons per minute (gpm) and an annual production volume of 483.65 acre-feet (157.6 million gallons). The well permit was enlarged by Permit No. U.W. 201420 to allow water to be pumped to the Western Sky Reservoir located north of the well. Both permits expired automatically per SEO policy for water haul activities and a new permit was filed for the well and granted under Permit No. 205378. The permitted pumping rate under the new permit was 300 gpm and the annual production volume was 245 acre-feet (79.8 million gallons). This permit was voluntarily cancelled by the well owners. The current SEO permit is U.W. 210034 and has a priority date of October 12, 2018. The permitted pumping rate is 300 gpm and the annual production volume is 245 acre-feet. In November 2020 the owner of the well requested a 10-year extension for the permit, which was granted by the SEO. The expiration date for the permit is December 31, 2030. The water right for the well is not adjudicated but cannot be adjudicated because of the miscellaneous use for water haul.



SHOT PERFORATIONS	
TOP (FT)	BOTTOM (FT)
546	576
596	611
653	673
683	738
889	909
917	937
954	974

5 1/2-INCH, 0.015-INCH SLOT SCREENS	
TOP (FT)	BOTTOM (FT)
1,372	1,382
1,440	1,450
1,476	1,486
1,540	1,555
1,790	1,800
1,942	1,952
1,996	2,016
2,120	2,125
2,430	2,460
2,500	2,520
2,584	2,604
2,636	2,646

FORSGREN Associates Inc.

WESTERN SKY 1 WELL
AS-BUILT DIAGRAM
FIGURE 1

TABLE 1
WESTERN SKY 1 WELL
CONSTRUCTION SUMMARY

State Engineer Permit Number:	U.W. 199368 (cancelled), U.W. 201420, Enl. (cancelled), U.W. 205378 (cancelled), U.W. 210034	
Location:	SE, NW Section 26, Township 33 North, Range 71 West 42.803895°, -105.348043°	
Surface Elevation:	4,960 feet	
Total Depth Drilled:	2,816 feet	
Completed Depth:	2,676 feet	
Geologic Formation:	0 – 2,646 feet: Fort Union Formation 2,646 – 2,816: Lance Formation	
Hole Diameter:	0 – 50 feet: Unreported size for surface casing 50 – 1,200 feet: 14.75-inches 1,200 – 2,816 feet: 7.875-inches	
Casing:	0 – 50 feet: Unreported size surface casing 0 – 1,200 feet: 10.75-inch O.D. steel casing, J-55, 40.5 #/ft 1,176 – 2,675 feet: 5.5-inch O.D. steel casing, J-55, 17#/ft	
Production Intervals:	546 – 576 feet:	120 28-gram shot perforations
	596 - 611 feet:	60 28-gram shot perforations
	653 – 673 feet:	80 28-gram shot perforations
	683 - 738 feet:	220 28-gram shot perforations
	889 – 909 feet:	80 28-gram shot perforations
	917 – 937 feet:	80 28-gram shot perforations
	954 – 974 feet:	80 28-gram shot perforations
	1,372 – 1,382 feet:	5.5-inch stainless steel screens, 0.015” slot
	1,440 – 1,450 feet:	5.5-inch stainless steel screens, 0.015” slot
	1,476 – 1,486 feet:	5.5-inch stainless steel screens, 0.015” slot
	1,540 – 1,555 feet:	5.5-inch stainless steel screens, 0.015” slot
	1,942 – 1,952 feet:	5.5-inch stainless steel screens, 0.015” slot
	1,996 – 2,016 feet:	5.5-inch stainless steel screens, 0.015” slot
	2,120 – 2,125 feet:	5.5-inch stainless steel screens, 0.015” slot
	2,430 – 2,460 feet:	5.5-inch stainless steel screens, 0.015” slot
	2,500 – 2,520 feet:	5.5-inch stainless steel screens, 0.015” slot
	2,584 – 2,604 feet:	5.5-inch stainless steel screens, 0.015” slot
	2,636 – 2,646 feet:	5.5-inch stainless steel screens, 0.015” slot
Annular Seal:	0 – 1,200 feet:	Unreported type and volume
Static Water Level:	220 feet (August 2013)	
Pumping Equipment:	Franklin F8STS275 pump and 75 HP motor set at 1,070 feet	
Completion Date:	August 18, 2013	
Engineer:	Wester-Wetstein: Laramie, Wyoming	
Contractor:	Weston Engineering: Upton, Wyoming	

The Western Sky 1 well pumps to the Western Sky Pond (Permit No. P14947R) which has a surface area of 2.21 acres and volume of 16.13 acre-feet. The reservoir permit will automatically expire on December 31, 2025.

The well is located in the "Green Zone" defined by the SEO as non-tributary to the North Platte River and is therefore not subject to the conditions of the Platte River Recovery and Implementation Program.

The offer letter from Western Cable states that the well fully penetrates the Fort Union Formation and is therefore adequately constructed and implies that it has priority rights when compared to other wells in the area. A review of area water rights in the SEO e-permit database found no other wells in the area that appear to fully penetrate the Fort Union Formation. If a senior appropriator wants to file an interference complaint with the SEO then their well must be "adequately constructed". Adequately constructed means that the well must fully penetrate the aquifer and having casing of adequate size accommodate the needed well pump. Thus, unless a senior appropriator in the vicinity of the Western Sky 1 well decides to deepen their existing well no other appropriators appear to have standing to file an interference complaint.

Well Construction

The Western Sky 1 well had a total drilled depth of 2,816 feet and was completed to a total depth of 2,646 feet. Water was first used from the well on August 18, 2013. It is completed in the Fort Union Formation and the project geologist indicates on the lithologic log that the well fully penetrates the formation. The well was constructed by setting surface casing to a depth of 50 feet then drilling a 14.75-inch borehole and cementing 10.75-inch casing to a depth of 1,200 feet for a pump chamber. A 7.875-inch borehole was drilled for the production zone. Stainless steel well screens were placed across 14 permeable intervals from 1,372 to 2,646 feet. The well was developed and found to have lower than desired production and the 10.75-inch casing was shot perforated across seven intervals between 546 and 974 feet. The well yield increased as a result of the perforations of the shallower intervals. The static water level in the well recorded on the Statement of Completion was 220 feet.

A total of 48 hours of time was spent airlifting water from the well after it was drilled but before the upper casing was shot perforated. The long period of time spent developing the well was the result of low yield from the screened intervals which reduced the efficiency of the removal of drilling fluids, fine-grained sediments, and turbidity. The yield of water from the lower portion of the well was approximately 30 gpm. As described in the above paragraph, the well was shot perforated across the shallower portion of the Fort Union Formation and the well yield increase. Mr. Lonker states that the well was not developed after the perforations were made, which could account for the sediment production as the well is pumped.

A Franklin F8STS275, 75 HP submersible pump was installed in the well with the intake at 1,070 feet below ground level. The Statement of Completion for the well does not record the instantaneous pumping rate but the proposal from the well owners indicates the pumping rate is 275 gpm.

The original pump and motor were replaced in December 2016 after the original pump was "dead headed" because of ice in the discharge piping and the motor failed. The replacement pump is a Franklin 8STS75-350 4-stage pump with a 75 HP motor. The pump in new condition is capable of pumping 350 gpm against a total dynamic head of 660 feet at 60 Hz. At a frequency of 57 Hz, the pump should be capable of pumping 350 gpm against a total dynamic head of approximately 590 feet.

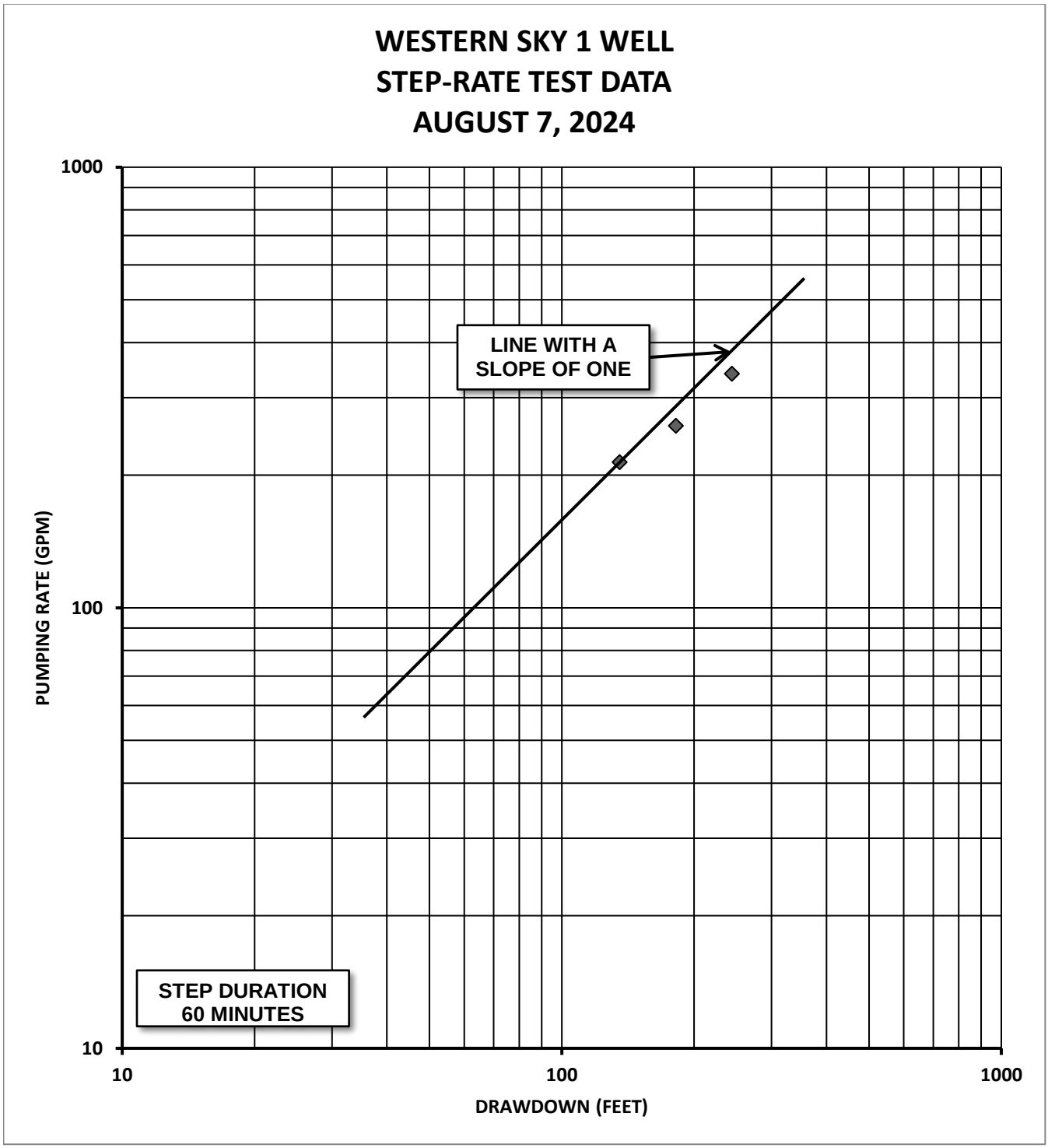

WESTERN SKY 1 WELL
STEP-RATE TEST DATA
AUGUST 7, 2024
1000
100
10
PUMPING RATE (GPM)
LINE WITH A
SLOPE OF ONE
STEP DURATION
60 MINUTES
10
100
1000
DRAWDOWN (FEET)

FIGURE 2

The Statement of Completion indicates that a pump test was not conducted prior to putting the well into production.

Water Production

The conditions and limitations of the SEO well permits for the Western Sky 1 well include monthly water production reports. Sporadic reports were submitted to the SEO for 2013 and 2014 and the last two months of 2018. Table 2 provides a summary of the reported monthly volumes of water pumped from the well between November 2018 and December 2023. The peak monthly volume of water produced was 7.6 million gallons, which equates to a constant pumping rate of 189 gpm. Many months had little production which was probably related to demand as versus well capacity. Production data are of limited use for determining well capacity, especially without water level data during pumping.

Well Testing

On August 7, 2024 a step-rate test was conducted on the Western Sky 1 well in an effort to determine possible long-term pumping rates and to observe any major changes in the well efficiency at various pumping rates. The permanent well pump was used for the test and an attempt was made to utilize the Yaskawa variable frequency drive (VFD) settings to avoid excessive pressure on the piping in the meter vault. The selected frequencies were 45 Hz, 50 Hz, and 57 Hz. The VFD was programmed at a maximum of 57 Hz by Western Cable's electrical contractor to protect the motor. An attempt was made to maintain some back pressure using the valve in the meter vault so that the valve could be adjusted to maintain a constant pumping rate for each step. However, without a pressure gauge in the discharge piping insufficient back pressure was achieved at the start of each step and the pumping rates dropped throughout the three pumping steps.

Water levels during the test were measured using the existing Dynotek Datamanager and downhole pressure transducer. The submergence of water over the transducer prior to pumping was 891.73 feet. A disinfected well sounder was used to measure the static water level in the well at 163.41 feet below the top of the well casing. The depth of the pressure transducer is 1,055.14 feet below the top of the well casing.

Each step was run for 60 minutes and the pump was turned off at the conclusion of the first two steps to adjust the VFD frequency settings. Table 3 provides a summary of the results of the step-rate test. The pumping rate in Table 3 is the final rate measured during each step and the drawdown is the drop in water level at the end of each 60-minute pumping period. The specific capacity is the pumping rate divided by the drawdown which gives an indication of the efficiency of entry of water into the well. Typically, the specific capacity will decrease at least slightly at higher pumping rates because of increased water velocity into the well and associated turbulent flow. The results in Table 3 show that the entry of water into the well did become slightly less efficient at higher pumping rates, but the data for the first step may be skewed by the effects of casing storage. Test data are affected by casing storage when a large part of the water pumped is removed from the well casing as versus from the aquifer. This typically occurs early in the test. Figure 2 is a logarithmic plot of the discharge versus the drawdown. In a 100% efficient well the data will plot along a line with a slope of one. The data in Figure 2 diagrammatically shows the slight decline in well efficiency at higher pumping rates.

TABLE 2

WESTERN SKY WELL WATER PRODUCTION 2018 - 2023, IN GALLONS

	2018	2019	2020	2021	2022	2023	AVERAGE 2019 - 2023
January		942,530	742,807	48,533	887,833	502,766	**624,894**
February		7,633,755	2,477,420	51,009	874,453	1,609,868	**2,529,301**
March		1,955,990	7,598,256	165,406	377,080	1,437,430	**2,306,832**
April		3,253,102	1,101,047	224,598	235,458	318,720	**1,026,585**
May		2,781,443	477,400	230,455	270,752	313,546	**814,719**
June		1,575,877	289,707	126,434	233,670	266,887	**498,515**
July		328,253	389,694	251,788	332,388	231,360	**306,697**
August		1,046,110	371,970	297,954	551,172	733,408	**600,123**
September		3,426,642	446,788	301,454	245,075	304,503	**944,892**
October		336,640	363,688	222,915	187,772	507,192	**323,641**
November	631,951	2,259,199	91,227	531,850	350,507	272,579	**701,072**
December	2,444,816	1,679,531	118,258	549,457	854,441	435,762	**727,490**
TOTAL	**3,076,768**	**27,219,071**	**14,468,262**	**3,001,854**	**5,400,601**	**6,934,018**	**11,404,761**
ADD	**8,430**	**74,573**	**39,639**	**8,224**	**14,796**	**18,997**	**31,246**
ACRE-FEET	**9.4**	**83.5**	**44.4**	**9.2**	**16.6**	**21.3**	**35.0**

TABLE 3
WESTERN SKY 1
STEP-RATE TEST SUMMARY

PUMPING RATE AFTER 60 MINUTES (GPM)	DRAWDOWN AT 60 MINUTES (FEET)	SPECIFIC CAPACITY (GPM/FOOT)
214	135.34	1.58
259	181.81	1.42
340	243.68	1.40

A long-term test was conducted on the Western Sky 1 well from December 3 – 5, 2024. The static water level prior to initiating the test was 153.15 feet, which was 10 feet higher than in early August 2024. Because the VFD drive cannot be adjusted while the pump is in operation it was not possible to reduce the motor speed to control the pumping rate and minimize backpressure on the meter vault piping. An attempt was made to use the butterfly valve in the meter pit to control the pumping rate at the beginning of the test but the insertion meter gasket would not hold the backpressure without leaking. The valve was closed as much as possible in an effort to maintain a constant pumping rate but a constant rate could not be achieved. The starting pumping rate was 325 gpm and the rate decreased as the water level dropped and the head increased. The pumping rate decreased to 300 gpm 45 minutes into the test and 274 gpm after eight hours. At an elapsed time of 31 hours the pumping rate was 251 gpm. After pumping for 58.3 hours the rate had declined to 239 gpm and appeared to have stabilized as the rate of drawdown was slowing. The valve was fully opened and the well was pumped at the maximum rate the pump would produce for 10 minutes. During that time the pumping rate started at 292 gpm but steadily declined to 280 gpm because the pumping water level quickly dropped and the test was ended.

Figure 3 is a plot of the drawdown versus time in a semi-logarithmic plot using the method developed by Cooper and Jacob (1946). Typically, constant-rate test data is plotted in this manner to facilitate calculation of aquifer transmissivity and to use a straight-line extension of the drawdown data to project future pumping water levels. With this test not having a constant pumping rate it is not possible to calculate the aquifer transmissivity. The total drawdown in the well, prior to opening the valve wide open, was 347.18 feet and the pumping water level was 500.33 feet. The time weighted average pumping rate for the test was 250.5 gpm.

Figure 3 contains a straight-line extension through the late-time pumping test data. The extension indicates that if the Western Sky 1 well was to be continually pumped for 40,000 minutes (27.8 days) the drawdown would be 450 feet, which would equal a pumping water level of approximately 603 feet. At that depth, 37 feet of perforated intervals would be dewatered, including the 30-foot thick uppermost perforated interval. Without a geophysical or lithologic log or pumping the well and dewatering the zone, the effect of dewatering the upper zone cannot be determined or estimated. However, it can be assumed that the well yield will be reduced when the zone is dewatered.

Water levels were measured at the conclusion of the long-term pumping test for 950 minutes (15.8 hours), which is 27 percent of the pump test duration. The recovery data are plotted on Figure 4 using the method developed by Cooper and Jacob (1946). The residual drawdown is plotted versus the ratio of T (time, in minutes, since the test was started) to T' (time, in minutes, since the test was ended). Later time recovery data lies to the left of the data plot. The recovery data indicate that the transmissivity of the aquifer is 650 gallons per day per foot (gpd/ft). The transmissivity value is not unreasonable for the Fort Union Aquifer. The water level in a well in a homogeneous aquifer

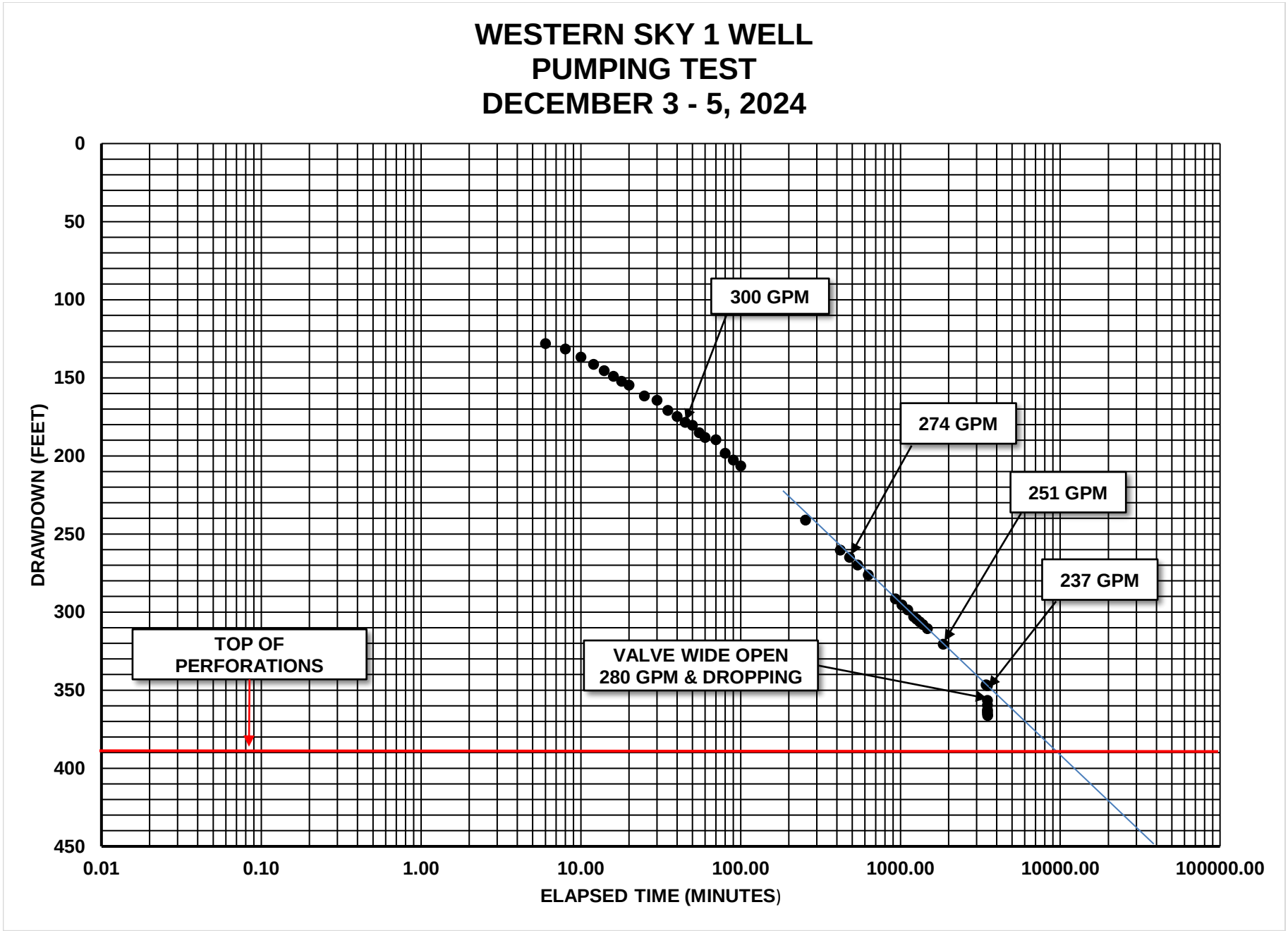

WESTERN SKY 1 WELL
PUMPING TEST
DECEMBER 3 - 5, 2024
DRAWDOWN (FEET)
0
50
100
150
200
250
300
350
400
450
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
100000.00
ELAPSED TIME (MINUTES)
300 GPM
274 GPM
251 GPM
237 GPM
TOP OF PERFORATIONS
VALVE WIDE OPEN
280 GPM & DROPPING

FIGURE 3

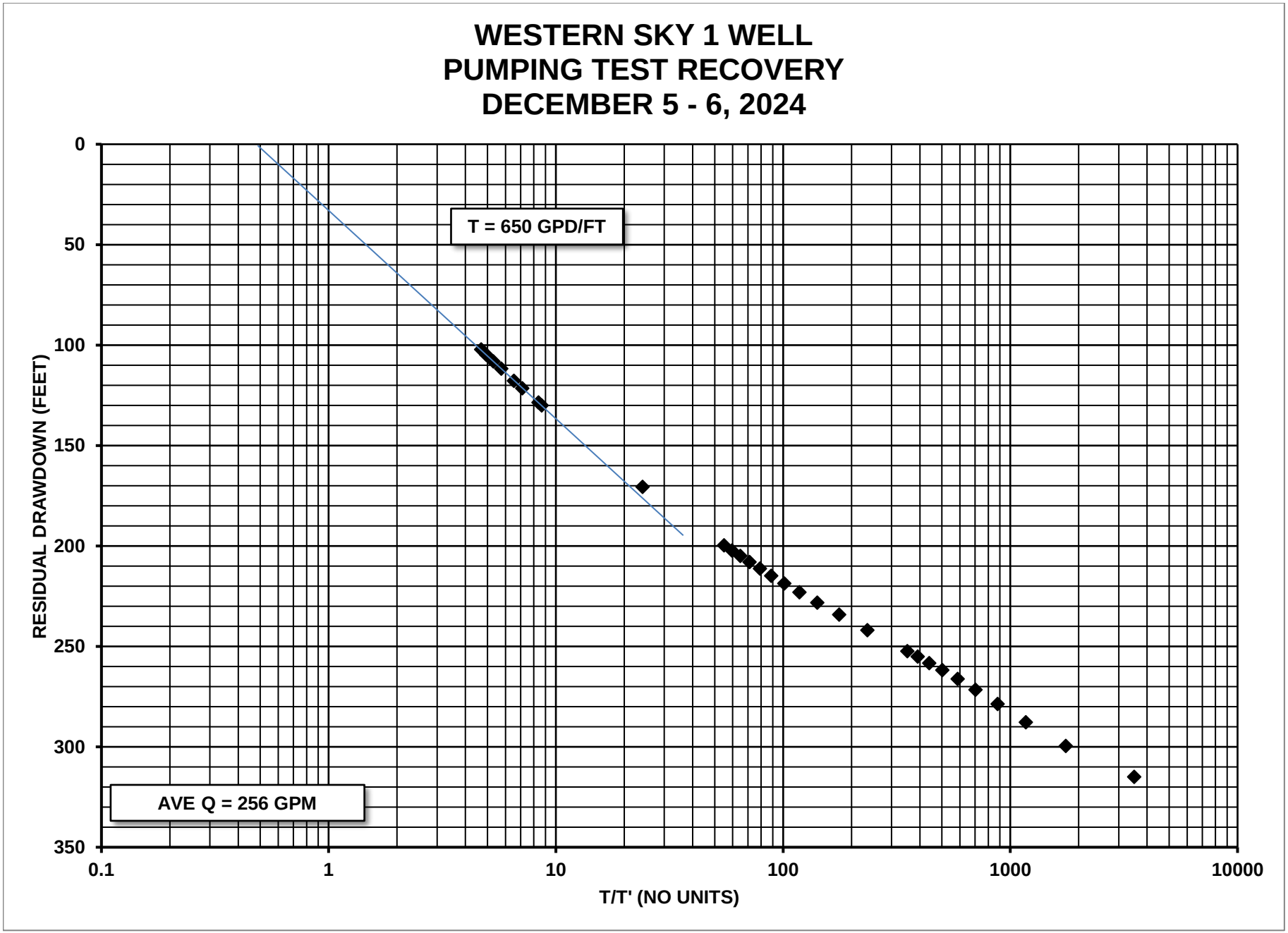

WESTERN SKY 1 WELL
PUMPING TEST RECOVERY
DECEMBER 5 - 6, 2024
T = 650 GPD/FT
AVE Q = 256 GPM
RESIDUAL DRAWDOWN (FEET)
0
50
100
150
200
250
300
350
0.1
1
10
100
1000
10000
T/T' (NO UNITS)

FIGURE 4

without boundaries or changes in storativity should achieve a zero residual drawdown at a T/T' value of one. Recovery data were not collected until the well fully recovered, but a trend line through the late-time recovery data to the zero residual drawdown intercept is provided on Figure 4. The predicted zero residual drawdown for the Western Sky 1 well occurs at a T/T' value of 0.5, which indicates a negative aquifer boundary was intercepted by the cone of depression or a change in the aquifer storativity (amount of water than can be released per square foot of aquifer material). If the recovery trend is the result of a negative boundary it could be either dewatering of a production zone or from the pumping of a nearby well. The data suggest that the well could be slow to recover after pumping, but if the well is used seasonally then the non-irrigation season would provide the opportunity for recovery.

Water Quality

Four sets of water quality samples have been collected from the Western Sky 1 well for laboratory analysis. All of the analyses have been submitted to and analyzed by Energy Laboratories. The earliest sample was collected by Western Sky Water, LLC on August 22, 2013 after the well was constructed. Forsgren Associates collected a suite of samples from the well on June 18, 2024 for the EPA Safe Drinking Water Act and DEQ-WQD Chapter 8 Table 1 list of constituents that are required for a new public water supply well. Follow up samples were collected by Forsgren Associates on August 7, 2024 and December 4, 2024 as a result of the detection of ammonia and oil and grease in the June 2024 samples. The results of the samples are summarized in Table 4.

The overall quality of water from the Western Sky 1 well is good, with a total dissolved solids concentration (TDS) of 448 mg/L. The EPA's secondary (non-enforceable) maximum concentration for TDS is 500 mg/L. The major dissolved constituents are sodium and bicarbonate. The water is significantly softer than water from Little Box Elder Spring and Sheep Mountain Well No. 1. The TDS, bicarbonate, and sodium concentrations all increased in the Western Sky 1 well between 2013 and 2024, while the sulfate and iron concentrations decreased.

The dissolved constituents of concern from the Western Sky 1 well include iron, oil & grease and ammonia. The EPA secondary standard for iron is 0.3 mg/L and the results are 0.41 and 0.47 mg/L for the 2024 samples. The standard for iron is set because of the potential for staining.

There are no EPA standards for ammonia and oil & grease. The DEQ recommends no more than 0.5 mg/L for ammonia and that the water be "virtually free" of oil & grease. The June 18, 2024 sample had a detection for oil & grease. The laboratory report states that the value was "estimated" because oil & grease was present but the concentration was less than the reporting limit of five mg/L. A follow up sample for oil & grease from August 7, 2024 was non-detect. BTEX, DRO, GRO, purgeable hydrocarbons, and extractable organics were sampled on August 7, 2024 to ensure that the oil & grease detection was not related to petroleum products. The results of the analyses were all non-detect. Based on the follow-up samples oil & grease is not a significant concern. The ammonia results for the well water are 1.56, 1.20, and 1.05 mg/L for the three samples collected in 2024. The source of the ammonia is likely the decomposition of methane gas. The August 7, 2024 sample had a dissolved methane concentration of 8.9 mg/L and gas bubbles were visible in the discharged water. The total organic carbon concentration of 1.0 mg/L is likely related to the presence of gas.

As stated in the July 24, 2024 letter to the City, water pumped from the well contained a trace of fine sand and coal. While the amount of coal observed was minor, the total volume of material could require removal to prevent accumulation in pipelines. Methane gas was observed in the discharged water but is not likely to be an issue with the down-hole pumping equipment because of the depth of the pump setting and the pressure on the water at depth.

TABLE 4
WESTERN SKY 1 WELL
WATER SAMPLE ANALYTICAL RESULTS AND
COMPARISON WITH EPA DRINKING WATER STANDARDS

Units in mg/L (except as noted)	Drinking Water Standard	Western Sky 1 8/22/2013 Energy Labs	Western Sky 1 6/18/2024 Energy Labs	Western Sky 1 8/7/2024 Energy Labs	Western Sky 1 12/4/2024 Energy Labs
Primary EPA Parameters					
Volatile Organic Compounds	Various		Not Detected		
Synthetic Organic Compounds- Pesticides	Various		Not Detected		
Synthetic Organic Compounds- Herbicides	Various		Not Detected		
Semi-Volatile Organic Compounds	Various		Not Detected		
Synthetic Organic Compounds- Carbamates	Various		Not Detected		
Haloacetic Acids (ug/L)	60		3.3		
Antimony	0.006		Not Detected		
Arsenic	0.010		Not Detected		
Barium	2	Not Detected	0.11		
Beryllium	0.004		Not Detected		
Cadmium	0.005		Not Detected		
Chromium	0.1		Not Detected		
Copper	1.3		Not Detected		
Cyanide	0.2		Not Detected		
Fluoride	4.0		1.3		
Lead	0.015		Not Detected		
Mercury	0.002		Not Detected		
Nickel	0.1		Not Detected		
Nitrate, as N	10		Not Detected		
Nitrite (as N)	1		Not Detected		
Selenium	0.05		Not Detected		
Thallium	0.002		Not Detected		
Gross alpha, pCi/L	15		4.1 +/- 2.3		
Gross alpha, adjusted, pCi/L	15		4.1 +/- 2.3		
Radium 226, pCi/L	5		0.8 +/- 0.3		
Radium 228, pCi/L	5		-0.07 +/- 0.6		
Combined Radium 226+228, pCi/L	5		1.1 +/- 0.7		
Uranium	0.03		Not Detected		
Uranium, Activity (pCi/L)	20		Not Detected		
Total Coliform	Absent		Absent		
E. Coli	Absent		Absent		
Secondary EPA Parameters					
pH (standard units)	6.5 - 8.5	7.21	8.0		
Total Dissolved Solids at 180C	500 / 1,000	388	448		
Conductivity (micromhos/cm @ 25°C)	No Standard	614	734		
Alkalinity, Total as CaCO3	No Standard		309		
Aluminum	0.2		0.05		
Bicarbonate as HCO3	No Standard	286	378		
Boron	No Standard		0.09		
Calcium	No Standard	8	9		
Carbonate as CO3	No Standard	Not Detected	Not Detected		
Chloride	250	8	8		
Color (color units)	15		15		
Hardness, as CaCO3	No Standard		47.1		
Iron	0.3	**0.48**	**0.41**		**0.47**
Langlier Index (no units)	No Standard		0.01		
Magnesium	No Standard	5	6		
Manganese	0.05		0.015		
MBAs	0.50		Not Detected		
Odor (threshold odor number)	3		2		
Silver	0.1		Not Detected		
Sodium	No Standard	126	147		
Sulfate	250	80	61		
Turbidity (NTU)	No Standard		4.1		
Zinc	5		Not Detected		
DEQ Chapter 8, Table 1					
Ammonia, as N	0.5		**1.56**	**1.20**	**1.05**
Cobalt	No Standard		Not Detected		
Hydrogen Sulfide	0.05		Not Detected		
Lithium	No Standard		Not Detected	Not Detected	
Oil & Grease	Virtually Free		**1 J**	Not Detected	
Phenolics	0		Not Detected		
Residual Sodium Carbonate (meq/L)	No Standard		5.21		
SAR (No units)	No Standard		9.10		
Vanadium	No Standard		Not Detected		
Miscellaneous					
Total Organic Carbon				1.0	Not Detected
Benzene				Not Detected	
Ethylbenzene				Not Detected	
Toluene				Not Detected	
m+p-Xylenes				Not Detected	
o-Xylene				Not Detected	
Gasoline Range Organics				Not Detected	
Total Purgeable Hydrocarbons				Not Detected	
Diesel Range Organics				Not Detected	
Total Extractable Organics				Not Detected	
Methane				8.9	

Blank Field = Not Sampled; J = Estimated value.

Water Treatment

Disinfection of water produced from the Western Sky 1 well for potable water using chlorine or chloramines would result in the formation of significant concentrations of disinfection by-products, which are regulated by the U.S. EPA as carcinogens. The disinfection by-products would form from the interaction of the chlorine and the methane and ammonia. Treatment for iron in water from the Western Sky 1 well would be needed to reduce the potential for staining of plumbing fixtures and other surfaces that come into contact with the water as well as for control of odor.

The water quality results from the Western Sky 1 well were provided to a drinking treatment systems manufacturer representative for the purposes of determining the best methods and obtain budgetary cost estimates. The consensus for treatment is that the best alternatives include de-gassing the produced water, passing the water through filter media comprised of anthracite and green sand, chlorine disinfection, and water conditioning with potassium permanganate. The treatment system would have a capacity of 200 gpm and need to be housed in a building. A small pond for backwash water would also be required. The cost for the treatment equipment, exclusive of site work, building, backwash pond, yard piping, electrical service, and engineering services is $450,000. It is estimated that with the total cost for all treatment components would be approximately $1.0 to $1.5 million, with some overlap in costs presented in the June 2023 conceptual-level estimate by CEPI.

Miscellaneous

The Western Sky 1 well is located on a 56.60-acre parcel of land owned by Western Cable, LLC. The owners of the well have indicated that they would sell a small parcel of property around the well and an easement across the property for accessing the well site. Additionally, the offer letter states a second well could potentially be located in the area if needed.

Well Value

White Mountain Operating, of Pinedale, WY, was contacted to obtain an estimated cost for drilling a new water supply well with a design similar to the current well configuration. As shown in Table 5 the current day cost estimate for construction of a new well similar to the existing Western Sky 1 well is $1,457,227. At the present time the Western Sky 1 well is 12 years old. Assuming that the life expectancy of the average well is 40 years, and salvage value is $1,000, then the depreciation using a straight line method is 2.5% per year ($36,406). The accumulated depreciation to date is $436,872 and the estimated current value of the well is $1,020,355. This cost does not include land, electrical service, etc. It also assumes that the well pump is 12 years old.

CEPI, the Douglas City Engineer, prepared a cost estimate in June 2023 for an improvement project for bringing the Western Sky 1 well up to drinking water standards and connecting the well to the Douglas water distribution system near Fourth Street. The cost estimate is provided in Table 6. CEPI was unaware of the water quality concerns and the need for more expensive treatment than simple chlorination. The cost estimate includes a small water storage tank, controls building, pressure control building, and SCADA upgrades and the total expected cost with contingency and engineering is $4,347,000.

TABLE 5
WESTERN SKY WELL COST ESTIMATE - JANUARY 2025

Item	Description	Quantity	Unit	Unit Price	Total Amount
1	Furnish Bonds & Insurance	1	L.S.	$36,500.00	$36,500.00
2	Mobilization & Demobilization	1	L.S.	$82,000.00	$82,000.00
3	Drill for, Furnish, Install & Cement 16-inch Surface Casing	50	L.F.	$500.00	$25,000.00
4	Drill 14 3/4-inch Diameter Hole	1,200	L.F.	$202.50	$243,000.00
5	Furnish & Install 10 3/4-inch O.D. Steel Casing	1,200	L.F.	$50.00	$60,000.00
6	Furnish & Install Cement Seal	1	L.S.	$61,875.00	$61,875.00
7	Drill 7 7/8-inch Diameter Hole	1,476	L.F.	$202.50	$298,890.00
8	Open Hole Geophysical Logging	1	L.S.	$15,000.00	$15,000.00
9	Furnish & Install/Liner/Packer Hanger Assembly	1	L.S.	$23,750.00	$23,750.00
10	Furnish & Install 5 1/2-inch O.D. Steel Casing	1,330	L.F.	$45.15	$60,049.50
11	Furnish & Install 5-inch, 0.015-inch Slot Size Stainless Steel Well Scren	170	L.F.	$206.25	$35,062.50
12	Shot Perforations 28-Gram, 4/Foot	160	L.F.	$550.00	$88,000.00
13	Well Development & Rig Time	12	Hours	$950.00	$11,400.00
14	Air Development	24	Hours	$950.00	$22,800.00
15	Furnish & Install Pitless Unit	1	L.S.	$30,000.00	$30,000.00
16	Furnish & Install 5-inch Pump Column Pipe	1,060	L.F.	$100.00	$106,000.00
17	Furnish & Install 00 Pump Cable	1,060	L.F.	$90.00	$95,400.00
18	Furnish & Install 300 gpm 75 HP Pump & Motor	1	L.S.	$125,000.00	$125,000.00
19	Furnish & Install VFD Pump Controls	1	L.S.	$37,500.00	$37,500.00
			TOTAL ESTIMATE		**$1,457,227.00**

TABLE 6
CITY OF DOUGLAS
Cost Estimate
WESTERN SKY 1 REPURPOSE

Date:	6/21/2023				
Item	**Description**	**Units**	**Quantity**	**Unit Price**	**Item Price**
1	Mobilization and Bonding	LS	1	$100,000.00	$100,000.00
2	8" PVC Transmission Main and Appurtenances	LF	17000	$125.00	$2,125,000.00
3	50,000 Gallon Water Storage Tank	LS	1	$250,000.00	$250,000.00
4	Chlorine/Well Control Building	LS	1	$250,000.00	$250,000.00
5	Well Improvements	LS	1	$75,000.00	$75,000.00
6	Pressure Control Building	LS	1	$250,000.00	$250,000.00
7	SCADA	LS	1	$100,000.00	$100,000.00
	Total Contract Estimate				**$3,150,000.00**
	20% Construction Contingency				$630,000.00
	Construction Cost Estimate				**$3,780,000.00**
	15% Engineering (Design and Construction)				$567,000.00
	Total Construction Cost Estimate				**$4,347,000.00**

Conclusions and Recommendations

Western Cable, LLC is offering to sell the Western Sky 1 well to the City of Douglas for the sum of $1,550,000. A recent cost estimate for well construction determined that the approximate cost for new construction is $1,457,227 and with depreciation the present worth is approximately $1,020,355, exclusive of land, access, and other site considerations. Pump testing of the well found that the long-term yield for seasonal use of the well is likely to be 175 to 200 gpm, based on the need to maintain little to no dewatering of the upper perforated intervals. If the well were to be used for a potable source of supply then additional work would likely be required by the Wyoming DEQ, such as removal of the pumping equipment and conducting a bond log. The water quality would require extensive treatment and the probable cost for that infrastructure is approximately $1,250,000. Installation of additional infrastructure such as a water storage tank, controls and pipeline could add up to $4,347,000 for a total cost of $7,145,550 if the well was purchased at the asking price. These are conceptual-level cost estimates but do help to guide decision making.

If the well were to be used as a supplemental supply for large-scale landscape watering then treatment could be minimized and there would be some cost savings. A storage tank would be recommended to aid in hydraulic management and a small controls building with SCADA would be needed. A new 8-inch water line could be extended from the well to the Cemetery tank, which would be approximately 20,000 feet in length if an overland route were selected. A pressure control vault at the Cemetery tank and improvements to the well would also be included in the project. The total cost of the improvements with contingency and engineering would be approximately $4.6 million. The advantage of this option would be the ability to tie additional wells to the line to increase the non-potable amounts of water available to the City.

The well is located within the "green zone" as delineated by the SEO and is therefore not subject to the conditions and limitations associated with the Platte River Recovery and Implementation Program. Should the well be purchased by the City then water pumped from the well and treated at the wastewater treatment plant could be claimed as make up water for annual depletions from tributary sources used by the City. If the well is purchased then the existing permit for water haul activities would need to be cancelled and a new permit filed for municipal use. Simultaneously the reservoir permit would need to be cancelled. The SEO well permitting process should be relatively simple but discussions with the SEO Groundwater division staff should be held to address any possible concerns they may have.

The costs for the Western Sky 1 well are significant and connection of the well to the City's infrastructure would be a large investment. Assuming that the purchase cost of the well and infrastructure to convey water to the Cemetery tank is $6,150,000 and the desired payout period is 10 years then the cost would be $615,000. If the well pumps at 150 gpm for 121 days (May 15 to September 15) then the water production would be 26 million gallons per season. The cost per 1,000 gallons of water for the infrastructure investment over a 10-year period would be $23.53.

I look forward to additional discussions regarding this investigation and the results. Please let me know if you have any questions, concerns, or comments regarding this letter.

Sincerely,



Ben J. Jordan, P.G.
Forsgren Associates, Inc.

References Cited

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Appendix F- Financial Planning Information

Includes background information on scenarios and requirements to meet the proposed CIP.

Three different capital planning/capital financing plans were developed as part of the master planning effort. These plans all had the same level of capital spending with different means of financing the projects contained in the plan. These projects included projects already contained on the City's CIP list as well as projects developed as part of this planning process.

- Scenario 1: Assumes there will be no state, federal or outside funding assistance utilized.
- Scenario 2: Assumes that funding for WWDC eligible components will be in the form of a 50% grant from WWDC and a 50% loan from WWDC (4%, 30-year term), and funding for WWDC non-eligible components will only be in the form of sponsor contribution from current or proposed water system revenues.
- Scenario 3: Additional funding sources were identified outside of WWDC (primarily DWSRF loans) that the sponsor can pursue to obtain the 50% loan component and to fund WWDC non-eligible components that are necessary for the completion of a Level III construction project.

A summary of the capital spending and financing mechanisms are summarized in Table F-1. Revenue requirements and predicted monthly bills are shown in Table F-2.

Table F-1. Capital Spending Summary

Scenario	Total Capital Cost	Cash Funded	Market Loan	Other Loan	WWDC Loan	WWDC Grant
1	$ 143,800,868	$ 30,101,968	$ 113,698,900	$ -	$ -	$ -
2	$ 143,800,868	$ 30,101,968	$ 73,216,200	$ -	$ 20,241,350	$ 20,241,350
3	$ 143,800,868	$ 30,101,968	$ 27,709,300	$ 45,506,900	$ 20,241,350	$ 20,241,350

Table F-2. Revenue Requirement Projections and Monthly Bill Projections

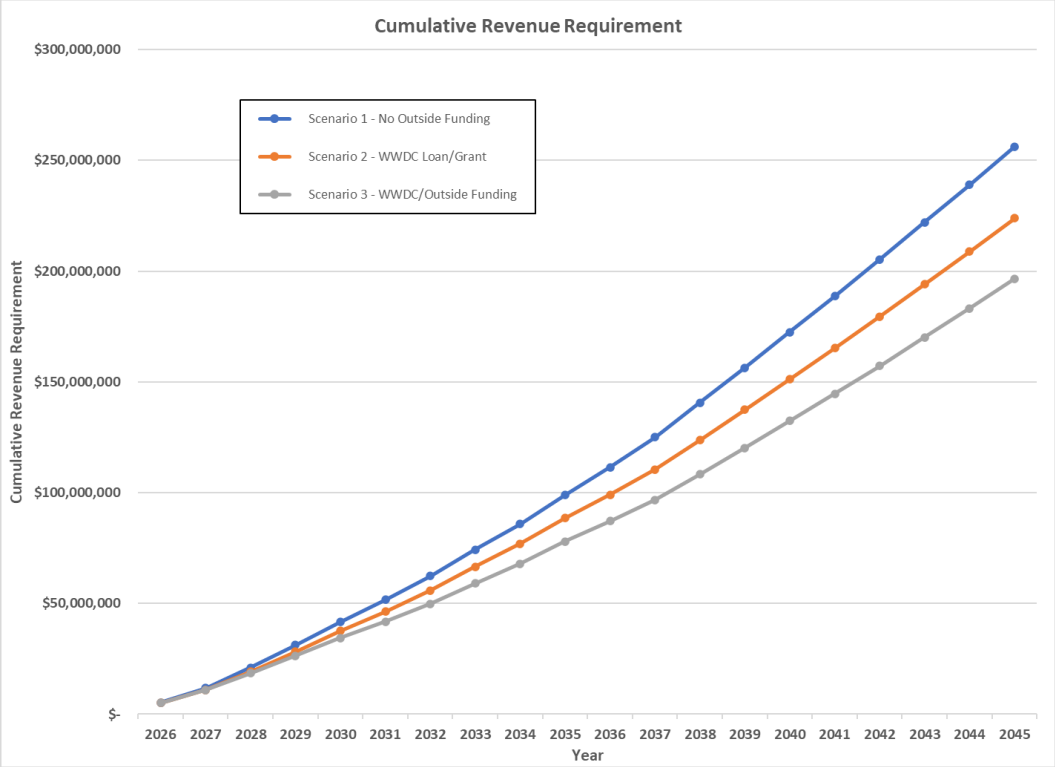
Item	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Annual Revenue Requirement																				
Scenario 1 - No Outside Funding	$ 5,201,717	$ 6,535,943	$ 9,310,085	$ 10,173,611	$ 10,424,663	$ 9,968,143	$ 10,761,293	$ 11,853,617	$ 11,617,696	$ 13,093,070	$ 12,548,887	$ 13,490,616	$ 15,601,385	$ 15,815,477	$ 16,037,992	$ 16,269,282	$ 16,509,716	$ 16,759,679	$ 17,019,571	$ 17,289,812
Scenario 2 - WWDC Loan/Grant	$ 5,028,145	$ 5,826,906	$ 8,238,471	$ 9,101,997	$ 9,353,048	$ 8,777,435	$ 9,538,854	$ 10,631,178	$ 10,395,257	$ 11,658,516	$ 10,576,938	$ 11,264,742	$ 13,375,511	$ 13,589,603	$ 13,812,118	$ 14,043,408	$ 14,283,842	$ 14,533,805	$ 14,793,697	$ 15,063,938
Scenario 3 - WWDC/Outside Funding	$ 5,028,145	$ 5,826,906	$ 7,607,892	$ 7,840,838	$ 8,091,890	$ 7,435,630	$ 8,029,123	$ 9,121,447	$ 8,885,526	$ 10,148,785	$ 9,069,207	$ 9,566,560	$ 11,677,329	$ 11,891,421	$ 12,113,936	$ 12,345,227	$ 12,585,661	$ 12,835,623	$ 13,095,515	$ 13,365,757
Cumulative Revenue Requirement																				
Scenario 1 - No Outside Funding	$ 5,201,717	$ 11,737,660	$ 21,047,746	$ 31,221,357	$ 41,646,019	$ 51,614,162	$ 62,375,455	$ 74,229,073	$ 85,846,768	$ 98,939,838	$ 111,488,725	$ 124,979,341	$ 140,580,726	$ 156,396,203	$ 172,434,195	$ 188,703,478	$ 205,213,194	$ 221,972,873	$ 238,992,444	$ 256,282,256
Scenario 2 - WWDC Loan/Grant	$ 5,028,145	$ 10,855,051	$ 19,093,522	$ 28,195,519	$ 37,548,567	$ 46,326,002	$ 55,864,856	$ 66,496,034	$ 76,891,291	$ 88,549,807	$ 99,128,745	$ 110,393,487	$ 123,768,998	$ 137,358,601	$ 151,170,719	$ 165,214,127	$ 179,497,969	$ 194,031,774	$ 208,825,470	$ 223,889,409
Scenario 3 - WWDC/Outside Funding	$ 5,028,145	$ 10,855,051	$ 18,462,943	$ 26,303,781	$ 34,395,671	$ 41,831,302	$ 49,860,425	$ 58,981,872	$ 67,867,398	$ 78,016,184	$ 87,085,391	$ 96,651,951	$ 108,329,280	$ 120,220,701	$ 132,334,638	$ 144,679,864	$ 157,265,525	$ 170,101,148	$ 183,196,663	$ 196,562,419
Annual % Change in Revnue Requirement																				
Scenario 1 - No Outside Funding		25.6%	42.4%	9.3%	2.5%	-4.4%	8.0%	10.2%	-2.0%	12.7%	-4.2%	7.5%	15.6%	1.4%	1.4%	1.4%	1.5%	1.5%	1.6%	1.6%
Scenario 2 - WWDC Loan/Grant		15.9%	41.4%	10.5%	2.8%	-6.2%	8.7%	11.5%	-2.2%	12.2%	-9.3%	6.5%	18.7%	1.6%	1.6%	1.7%	1.7%	1.7%	1.8%	1.8%
Scenario 3 - WWDC/Outside Funding		15.9%	30.6%	3.1%	3.2%	-8.1%	8.0%	13.6%	-2.6%	14.2%	-10.6%	5.5%	22.1%	1.8%	1.9%	1.9%	1.9%	2.0%	2.0%	2.1%
Cumulative % Change in Revenue Requirement																				
Scenario 1 - No Outside Funding	0.0%	25.6%	68.1%	77.4%	79.8%	75.5%	83.4%	93.6%	91.6%	104.3%	100.1%	107.6%	123.3%	124.6%	126.0%	127.5%	129.0%	130.5%	132.0%	133.6%
Scenario 2 - WWDC Loan/Grant	0.0%	15.9%	57.3%	67.8%	70.5%	64.4%	73.0%	84.5%	82.3%	94.4%	85.2%	91.6%	110.4%	112.0%	113.6%	115.3%	117.0%	118.8%	120.5%	122.4%
Scenario 3 - WWDC/Outside Funding	0.0%	15.9%	46.5%	49.5%	52.7%	44.6%	52.6%	66.2%	63.6%	77.8%	67.2%	72.7%	94.7%	96.6%	98.4%	100.3%	102.3%	104.3%	106.3%	108.4%
Monthly Water Bill (7,500 gallons)																				
Scenario 1 - No Outside Funding	$ 63.81	$ 82.92	$ 116.10	$ 174.19	$ 191.61	$ 201.18	$ 211.25	$ 221.84	$ 221.84	$ 221.84	$ 232.97	$ 244.65	$ 256.90	$ 264.60	$ 272.52	$ 272.52	$ 272.52	$ 272.52	$ 272.52	$ 272.52
Scenario 2 - WWDC Loan/Grant	$ 63.81	$ 82.92	$ 103.65	$ 145.11	$ 174.12	$ 174.12	$ 174.12	$ 179.31	$ 184.66	$ 193.87	$ 203.58	$ 213.73	$ 224.40	$ 231.16	$ 231.16	$ 231.16	$ 231.16	$ 231.16	$ 231.16	$ 231.16
Scenario 3 - WWDC/Outside Funding	$ 63.81	$ 76.60	$ 84.28	$ 117.99	$ 147.48	$ 147.48	$ 147.48	$ 154.84	$ 162.56	$ 170.66	$ 179.23	$ 184.58	$ 190.10	$ 195.80	$ 201.67	$ 201.67	$ 201.67	$ 201.67	$ 201.67	$ 201.67

It should be noted that for each scenario, the capital financing model was configured to set rates so that the utility always kept a 6-month cash reserve in the operating fund. This produces rates that are "smoother" from year to year and avoids the large variations in rates each year with rates increasing in years with large capital expenditures and rate decreasing in years with smaller capital expenditures than the preceding year. This also produces a more predictable monthly bill.

Scenario 1 (No Outside Funding) had the highest total cumulative revenue requirement over the planning period as all projects are funded through cash or debt with no grant funding.

Generally, the debt instruments assumed for this scenario also have the shortest payback periods and the highest interest rates. Conversely, Scenario 3 had the lowest total cumulative revenue requirement of the three capital funding scenarios as more grant funding was assumed to be available for some projects and debt instruments generally had longer payback periods and lower interest rates producing smaller annual debt payments (Figure F-1).

Figure F-1 – Cumulative Revenue Requirement for Each Scenario



When looking at the cumulative revenue requirement change expressed as a percentage, the same patterns hold true. Scenario 1 has the highest cumulative percent increase in the revenue requirement of 133.6%, while Scenario 3 has the lowest cumulative percent increase in the revenue requirement of 108.4% due to lower cost financing options being assumed (Figure F-2). In some years, the cumulative revenue requirement does decrease. This is due to more projects being cash funded in some years and less in other years causing a reduction in the annual revenue requirement.

In all scenarios the large available cash balance is used early on to help fund capital projects while mitigating rate increases although the modeled rate increases are still substantial. These large rate increases early on are the result of several projects with a large capital expense with a need for funding during the first five years of the planning period. Most notably is the Douglas WTP project with a planned cost of almost $34 million. It is assumed that this project would be debt funded; however, this still causes the revenue requirement to increase quickly in the first five years of the planning period, resulting in the large rate increases shown.

Lastly, Figure F-3 shows the projected monthly water bill for 7,500 gallons of use. These projections assume that the current rate structure remains unchanged and the rate amounts are increased as the revenue requirement increases.

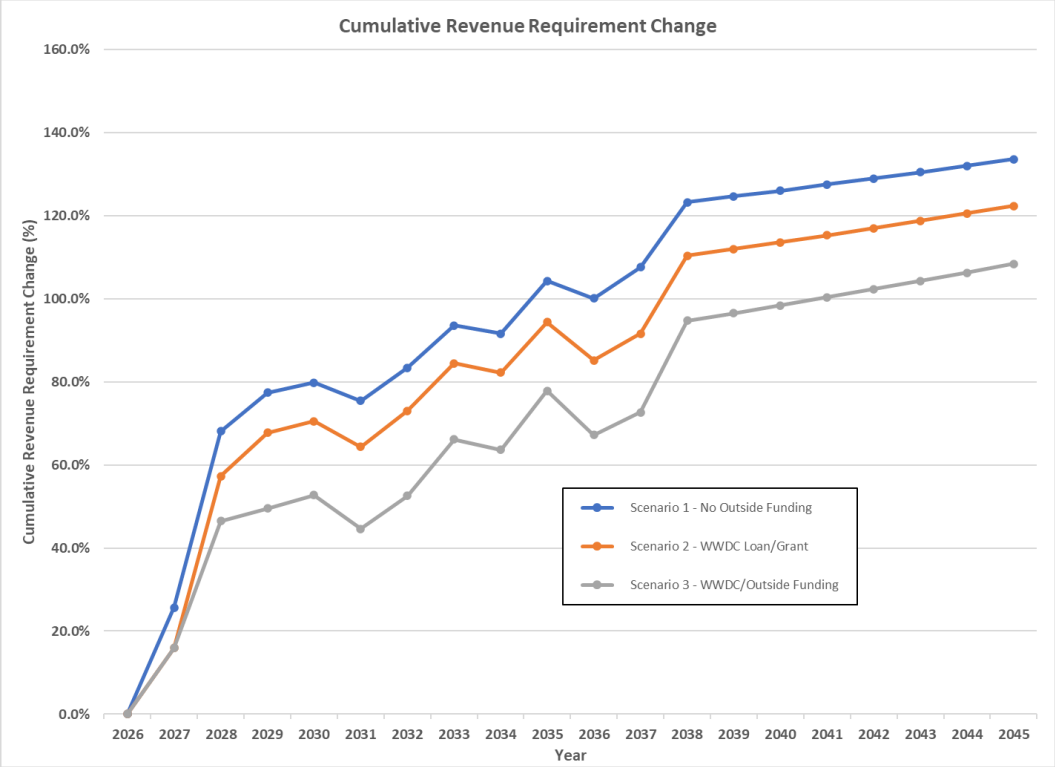


Figure F-2. Cumulative Revenue Requirement Change

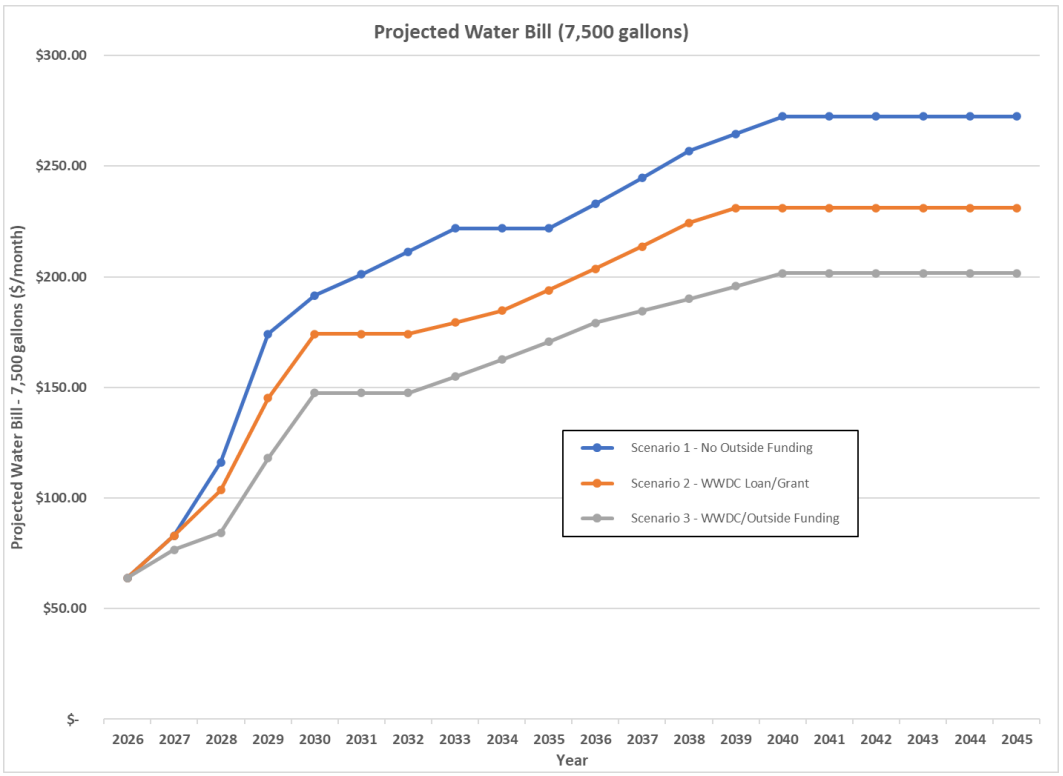


Figure F-3. Projected Monthly Water Bill for 7,500 gallons of use

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