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Preliminary Engineering Report

Cooke City Water System PER

April 2024

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List of Appendices

0 EXECUTIVE SUMMARY

0.1 Introduction

Cooke City is an unincorporated community located in south central Montana along US Highway 212 and surrounded by the Custer, Shoshone, and Gallatin National Forests. It is remote; accessible only by US Highway 212 (“Main Street”) which connects the northeast entrance of Yellowstone National Park, just 4 miles east, to the junction with Chief Joseph Highway and the Beartooth Highway about 15 miles east. The 2020 population of Cooke City was 77 residents and 45 households. Per statistics from the National Park Service, Between May and October of 2023, approximately 271,000 visitors came through the northeast entrance to Yellowstone National Park and through Cooke City. The number of visitors to Yellowstone National Park continues to steadily increase; consequently, so does the number of visitors using Cooke City’s sewer and water facilities.

Cooke City’s utilities are currently managed by two separate entities with no administrative overlap; The Cooke Pass, Cooke City, Silver Gate Sewer District and the Cooke City Water District.

As of 2023, Cooke City was facing significant challenges regarding its water system infrastructure, primarily related to existing inadequacies leading to low water pressures, freezing, and water waste. To address this issue, Cooke City Water District initiated preparation of a preliminary engineering report (PER) as part of its infrastructure improvement efforts.

The Cooke City Water District engaged the services of Triple Tree Engineering to complete the PER. This report documents the study, conclusions, and recommendations for enhancing the community’s water system facilities. The PER accesses the existing condition of the current water system, identifies problems within the system, and establishes recommendations and funding strategies for water system improvements. The study evaluates the needs of Cooke City, while analyzing both short-term and long-term planning horizons. A summary of the project background, problems, recommended improvements, costs, and funding strategies are presented in the Executive Summary.

0.2 Existing Facilities

The planning area for this PER is the limits of Cooke City in addition to two small corridors connecting the Town’s tank and wells to the existing distribution system. The tank is located approximately 0.35 miles northwest of town and can be accessed via Miller Road. The tank is supplied by a well site located approximately 1/3 mile west of town on Highway 212. A water system overall plan relative to the town is located in Appendix E.

0.2.1 Water Supply

Water is supplied to the Cooke City Water District system from three groundwater wells located approximately 1/3 of a mile west of town along Highway 212. Two of the wells are located on one site with the well house and are referred to as CCSW #1 and CCSW #2. The third well (CCSW #3) is located approximately 150’ further east towards Silver

Gate. All three wells are plumbed into an existing wellhouse. During a site visit in March 2024, all three wells were cycled and together pumped in excess of 220 gpm.

The current water system has never required treatment. The water district is currently in good standing with water testing requirements mandated by the Safe Drinking Water Act and Montana DEQ.

The District is currently operating on a good standing water right but, the amount of water is temporarily set at 220 (total) gpm. The DNRC is working with the District to obtain 5 years of metered water use data before setting the amount of water available for use under the water right. In January 2024, the Water District filed an extension to complete the permit to appropriate water rights. Due to system leaks and inoperable water meters, the Water District was having a difficult time obtaining accurate readings on actual water usage. The Water District is working to get an accurate measurement of water usage for the year before completing their water rights application. In summary, the District has a good water right for municipal use that is currently being monitored for water volume. Cooke City's 2044 peak daily demand is estimated at approximately 28,635 gpd. Also, the three wells in conjunction can produce approximately 250 gpm or 360,000 gpd. DEQ required that the system be analyzed with the largest well out of service; therefore, the system could provide 96,480 gpd with the largest well out of service. The wells have capacity to serve the projected population in 2044.

0.2.2 Storage

Prior to 2010, the Water District relied on two separate water tanks for its public water supply system. One tank was located east of town between the Soda Butte Spring (the town's original water source) and another 10,000 gallon galvanized water tank that was located northwest of town.

When the District built a new system in 2010, both existing tanks were abandoned and demolished. The 2010 project included installation of a new 150,000 gallon welded steel tank that is still in use today. Per original plans from Great West Engineering, the tank is lined, and supported by a concrete foundation. The tank is equipped with an internal mixer that is currently not operational.

The community storage tank is inadequate for the fire flows required by the ISO but, limitations of the community's distribution system hinder the possible flow. When we account for these limitations, the community's storage tank has the exact required amount of storage for the 20-year planning period. Although the tank cannot provide ISO Full Credit Condition, the operator and the District have indicated no concerns with the tank.

0.2.3 Distribution System

All well outlet pipes converge in a well house located south of Highway 212, approximately 1/3 mile west of Cooke City. From the well house, a singular outlet pipe ties into a 6" HDPE transmission main running east along Highway 212 to Cooke City. The transmission main caries water to a pressure reducing vault (PRV). The existing distribution main was built as part of the 2007 Beartooth highway project and finished during the 2010 water systems improvement project.

The existing PRV consists of a concrete manhole structure equipped with a lockable insulated access hatch and access ladder. Inside the structure, telemetry controls are wall mounted. A 10' antenna tower constructed of tubular steel is located next to the PRV for telemetry control communication between the PRV and well house. A single distribution main connects the PRV and the community's water storage tank.

Electronic pressure meters within the PRV calculate the water tank level and control supply of water from the wells to regulate the tank level.

Due to the elevation of the tank in relation to town, the water pressure is higher than desired. The PRV therefore reduces water pressure from upwards of 135 psi down to approximately 65 psi using mechanical "Cla" valves. Two master valves feed the distribution system from the tank. One regular pressure (low-flow) and one high pressure (high-flow) The lower pressure valve feeds the system during normal operation while the high pressure valve feeds the system during fire flow events.

Thence, from the PRV, water is distributed through a water main network to all system users. The distribution system to the town consists of a variety of water main types and sizes from various projects throughout the years. A 2002 PER written by Entranco indicated that the original water system was constructed in the 1950's and was added to in the 60's, 70's and 80's. At that time, the system consisted of 3", 4" and 6" AC and PVC pipes. The 2010 water system rehabilitation project replaced much of the system with 6" and 8" PVC; and HDPE. Records show that some of the main within the Highway 212 right-of-way was installed in 2007 as part of a Federal Highway Administration Project. A 2012 water main replacement project also replaced a section of water main on Broadway and Huston north of Main Street. In 2017 &2018, all of the current water meters were updated with advanced meter reading (AMR).

0.3 Need for the Project

A summary of the system's existing problems is as follows:

- The existing well house roof is starting to fail, and requires repair or replacement.
- The system's water tank mixer and fence are currently broken and in need of repair.
- Dead-end mains with and without flushing capabilities are present within the system leading to freezing, low-pressure, restricted fire flow, stagnation of water and waste of water.

The well house roof is currently failing and buckling on the east side of the building. If the roof fails, it could lead to the destruction of thousands of dollars of equipment, loss of supply of water to Cooke City, and possible contamination of the supply system. Also, cracking of the electrical connection conduit at the well heads is in need of repair.

The community storage tank installed in 2010 is in good working condition. The tank mixer however, is currently damaged and in need of repair or replacement. Without the mixer, the town's tank runs the risk of stratification and freezing. Ice in the tank could lead to a tear in the tank liner ultimately creating the risk of contamination and leakage. With a single line entering and exiting the tank, it is important to mix the water to avoid stratification and supply of stale water to users.

The existing distribution system consists of a variety of water main types and sizes from various projects throughout the years. Most of the system was replaced in 2007, 2010 and 2012 as part of water system rehabilitation projects. Some segments of the old main are still active in town with no record of when they were built and put into service. Dead end and aging mains exist throughout the distribution system. Currently, the distribution system experiences freezing and low-pressure, primarily in areas with dead-end mains. An automated water flush hydrant is still used on one section of main in the original distribution main.. The existing flush hydrant is estimated to waste up to 91,250 gallons of water per year.

0.4 Alternatives Considered

Various alternatives were considered to address the problems with the system. The various alternatives that were considered include:

- Alternative 1 -No Action
- Alternative 2 – Install Additional Flush Hydrants
- Alternative 3 – Replace & Upsize Existing Dead-End Mains
- Alternative 4 – Loop Existing Water Main

0.5 Selection of an Alternative

The above-mentioned alternatives were considered to address the problems with Cooke City's water system. A screening analysis comparing net present value and non-monetary factors was used to select the best alternative to correct system deficiencies. Costs considered in the net present value cost analysis include construction costs and contingency, engineering, and operations and maintenance. Some of the non-monetary factors considered in the selection of the alternatives include reliability, operational ease, impacts to existing facilities, public health and safety, local economic affect, environmental impacts, and public acceptance, technical and physical feasibility, and risk associated with the project.

0.6 Proposed Project

The recommended preferred alternative is **Alternative 4- Existing Water Main Looping** The total cost of the project is as follows:

- Administrative- $32,000
- Engineering- $280,172
- Construction-$1,147,382
- Contingency-$233,476
- **Total-$1,743,030**

The funding strategy is as follows:

- MCEP Grant–$750,000
- RRGL Grant-$125,000
- SRF Loan/Loan Forgiveness - $836,030
- Local Contribution-$32,000

1 PROJECT PLANNING

1.1 Location

The planning area for this PER is the Cooke City Water District limits, including corridors connecting the storage tank and wells to the distribution system. The tank is located approximately 0.1 miles northeast of the community. Cooke City is in Park County, along US Highway 212, at the northeast entrance of Yellowstone National Park. Cooke City is approximately 65 miles southeast of Red Lodge, and approximately 133 miles southeast of Bozeman, in Section 25, Township 9 South, Range 14, the tank is in Section 26, Township 9S, Range 14 E. The approximate latitude and longitude of Cooke City is 45°1’10” N and 109°56’ 04” W. An aerial photograph exhibit indicating the general location and layout of the town is included below.

Figure 1 Aerial Photo

1.2 Environmental Resources Present

Cooke City's history is deeply intertwined with its mining heritage, with past mining activities shaping land use and water quality. Efforts to reclaim sites like the former McLaren mine demonstrate Montana's commitment to environmental restoration. Despite its mining legacy, Cooke City's natural beauty attracts thousands of visitors annually, drawn by activities ranging from summer tourism to winter sports. Groundwater wells southwest of town provide plentiful, high-quality water, meeting potable standards without treatment. Managed by the US Forest Service, the surrounding land is protected to preserve its environmental integrity, balancing conservation with controlled resource extraction.

State and federally funded projects are subject to either the Montana Environmental Policy Act (MEPA) or the National Environmental Policy Act of 1969 (NEPA), or both. MEPA seeks to avoid or mitigate adverse impacts on the natural and human environment by mandating careful consideration of the potential impacts of any development assisted with state funds or approved by a state agency. NEPA establishes national policy, goals, and procedures for protecting, restoring, and enhancing environmental quality. Several federal and state agencies were contacted to identify potential environmental impacts that might be associated with the proposed project. Correspondence with the affected agencies is included in Appendix A.

1.3 Population Trends

Cooke City is an unincorporated community and therefore is therefore documented by the US Census Bureau. The population of Cooke City has been steady for a decade with little to almost no growth. The population of Cooke City had an annual population change of 0.27% from the 2010 to 2020 census. Prior to the 2010 census, Cooke City was part of the Cooke City-Silver Gate CDP. This limited historical population data is specific to Cooke City. The census information is included in Appendix B.

Table 1: Population Trends

	Year	Population	Percent Change	Percent Change per Year
US CENSUS	2010	75	NA	NA
	2020	77	2.67%	0.27%
AVERAGE			2.67%	0.27%
PROJECTED	2021	78	1.34%	0.27%
	2022	78	0.27%	0.27%
	2023	78	0.27%	0.27%
	2024	79	0.27%	0.27%
	2034	81	2.67%	0.27%
	2044	83	2.67%	0.27%

The following table summarizes Yellowstone National Park (YNP) visitor information through the northeast entrance and through Cooke City. It is important to note that the year 2022 has been omitted from the percent change calculations. Due to a tremendous flood year, the northeast entrance to the park was closed most of the 2022 season, causing a drop in visitors through the northeast entrance for that year.

Table 2: Visitors Through NE Entrance

Year	Park Visitors at NE Entrance	Percent Change
2013	190,002	
2014	204,486	7.08%
2015	230,859	11.42%
2016	228,040	-1.24%
2017	222,440	-2.52%
2018	223,758	0.59%
2019	239,830	6.70%
2020	219,975	-9.03%
2021	290,457	24.27%
2022	45,424	-539.44%
2023	270,991	-7.18%
Average Increase Per Year		3.34%

According to the 2015-2019 census data (required to be used to calculate target rates when applying for the MCEP program) the 2019 population is 63 people and 41 total households. The median household income is $36,875, and 42.9% of the population was at low to moderate income levels. The 2015-2019 ACS data is included in Appendix B. It is important to note that even through 2020 census data exists, it is a requirement that the most up-to-date data on the department of commerce website is used. When this PER was written, the Department of Commerce only had the 2015-2019 data for reference.

At the time of the 2020 census the median household income in Cooke City was $43,125. Cooke City is located at the northeast entrance of Yellowstone National Park, and nearly doubles in population every summer. This change brings more tourists and seasonal workers for the summer months, and does not appear to be a factor in the year-round population of the town. The historical growth rate of 0.26% per year has been used to estimate the population of Cooke City in 2044.

1.4 Community Engagement

The Water District has encouraged users to participate in the decision-making process of the project. The District holds board meetings on the third Tuesday of every month at 6 pm and encourages the public to join the meetings. Zoom and call-in options are also available for the public to access the meetings, making it easier.
The first public hearing was held April 8th, 2024 to obtain public comments regarding the future needs of the community's water system.

2 EXISTING FACILITIES

2.1 Location Map

Schematics of the existing water system are included in Appendix E.

2.2 History

Cooke City is an unincorporated community located in south central Montana along US Highway 212 and surrounded by the Custer, Shoshone, and Gallatin National Forests. It is remote; accessible only by US Highway 212 ("Main Street") which connects the northeast entrance of Yellowstone National Park, just 4 miles east, to the junction with Chief Joseph Highway and the Beartooth Highway about 15 miles east. Cooke City was originally started as a mining town in the late 1800's and was officially platted as a town site around that time.

The community's utilities are currently managed by two separate entities with no administrative overlap. As outlined in a PER completed for the Sewer District in 2020 by Performance Engineering, the history of the Sewer District is as follows:

> *The District was formed in 1973 by the District courts as the Cooke City-Cooke Pass-Silvergate Sewer District. As the name indicates, the Sewer District encompassed not just the community of Cooke City but also Cooke Pass to the east and Silvergate to the west. Once the District was formed it appears that little was done in the way of formally operating as a formal entity. The creation of the District was driven by the desire to access federal funding for construction of a community wastewater system. The District engaged Morrison-Maierle (M-M) in the early 80s to review the existing wastewater conditions for the community and provide a recommendation for development of a community wastewater collection, treatment and disposal system. M-M recommended installing a community collection system with the construction of a community septic and drainfield to be managed by the District in a specified location. The recommendation included abandonment and reclamation of the on-site systems used for each lot. At the time M-M estimated the total construction costs to be between $400,000-$500,000 for the recommended community system. Formal funding was requested through the Department of Interior but the request was not funded. Upon denial of the funding request the Sewer District went dormant and has remained in that state until the summer of 2019.*

Currently, the Sewer District is working with Triple Tree Engineering on design of a new project planned by a 2022 PER updatecompleted by Triple Tree Engineering. The project will utilize a community collection system and drainfield. Construction of the collection system is planned for initiation in the summer of 2024.

The Cooke City Water District history was mentioned in the same PER as follows:

> *The District has its organizational roots in a Water Users Association formed in 1947. The District incorporated in 1967, but only became active in 1985 in order to formalize the water supply and distribution system which predated modern regulations and practices. Open spring houses, subject to surface contamination,*

sourced the water for the community, and a strategically placed water tank provided varying pressure to the town's asbestos cement pipeline network. Flows dropped below basic service levels in the winter, and the pipes were undersized and unable to supply any sort of firefighting apparatus. The community accepted these limitations as a part of living in this remote and rugged environment. With the adoption of the Safe Drinking Water Act and its subsequent amendments, the District needed to make changes to ensure that it would continue to comply with the regulations by providing adequate, and potable water throughout the year. In the late 1990s, the written record indicates that the Montana Department of Environmental Quality (DEQ) directed the District to improve the system to ensure that the system was sanitary. The engaged consultant recommended improvements including the reconstruction of the spring houses, repairs to and upsizing of the water tank, and upsizing some of the water mains to provide fire flows for the community. Records and documents on file do not reveal the reasons why, but the USFS apparently declined to permit the proposed work at the existing sites, requiring instead that the District identify another source in a different location from the Soda Butte Campground, as well as abandoning the tank, and relocating the storage function elsewhere. That process increased the administrative and legal challenges associated with water (or sewer) facilities situated on public lands as several years passed as new well and tank sites were identified (again on USFS land) and leases were negotiated. The Water District now operates the newly installed community infrastructure which includes three supply wells, storage tank, and new distribution pipes. This project was completed in 2010 with modifications made to the pump station pumps and panels in 2018. The system is operational with a part-time operator and the District is managing the infrastructure and debt service as would be expected.

At the time of this PER, this District is servicing debt from four prior infrastructure projects.

2.3 Water Demands

The Water District records the quantity of water used through advanced automatic meter reading (AMR) equipment. The meters automatically collect and transfer water usage data to an online "cloud". The data is then analyzed using algorithms to help locate possible leaks within each user's system. The meters were originally installed in 2017 and 2018 as an effort to identify water leaks and are reviewed regularly by District staff. Additionally, water flow meters are installed at the well house. The data between these junctions is also analyzed to identify leakage within the system between the structures prior to the distribution system.

The water demand in Cooke City varies greatly from month to month due to the tourism driven fluctuations in population. Due to these changes, an average demand is calculated over an entire year compensating for fluctuations throughout the varying seasons. The average demand over the years is calculated by first summing the usage over the last two years then dividing by the total number of days (730 days for two years). It is necessary to estimate future demands on the system to determine when improvements might be required. The future demand is also used when designing a new facility to ensure it will meet the demands of the system well into the future. In this case, a 20-year planning period has been utilized.

To project the future water demands it is important to understand how much water is used per person. The per capita average day water demand is calculated by dividing the average day water demand by the number of residents. To calculate the per capita average day water demand it is necessary to ensure that the correct demand is being compared to the correct population; therefore, the population of Cooke City over the last few years will be compared to the corresponding average day water demand. A summary of the water supplied to the distribution system broken down by month, a calculation of the average day demand, and average day per capita demand for the Water District is included in the following table.

Table 3: Cooke City Water Usage

MONTH	TOTAL WATER USED (gallons)	
	2022	**2023**
January	422,720	416,470
February	422,910	422,840
March	447,860	389,720
April	295,050	206,480
May	457,880	401,030
June	598,610	661,330
July	707,720	891,930
August	646,290	759,060
September	581,210	598,200
October	480,600	298,320
November	477,810	219,900
December	467,980	333,020
Yearly Total*	6,006,640	5,598,300
Avg Day Demand (gpd)	**16,457**	**15,338**
Avg Per Capita Day Demand (gpcd)	**211**	**197**

The variation in water usage throughout the year can be attributed to tourism during the summer and fall months. From May to November when the Beartooth Highway is open, water usage in Cooke City increases on average 145% in relation to the rest of the year. Influx of people during these periods will play a large role in sizing the system during the planning period of this PER. To project the average day demand in the year 2044, the average per capita day demand of 204 gallons per capita per day will be compared to the projected population.

Table 4: Cooke City Projected Average Day Demand

YEAR	PROJECTED POPULATION OF COOKE CITY	AVERAGE DAY DEMAND		
		GPCD	GPD	GPM
2024	79	204	16,101	11
2034	81	204	16,509	11
2044	83	204	16,916	12

In accordance with Montana Department of Environmental Quality (DEQ) Circular 1, the water source and treatment facilities must be designed for maximum day demand in the design year. Our design year is 2044. To ensure the source can accommodate the future demands, a peak day factor is used to estimate peak day, or maximum day, demands. The peak day demand represents the day with the highest usage. The peak day factor is calculated by comparing the average day demand in any given year to the corresponding peak day demand for that year. The peaking factors have been summarized in the following tables.

Table 5: Cooke City Peaking Factors

DEMAND	TOTAL WATER USAGE	
	2022	2023
TOTAL (GALLONS)	6,006,640	5,598,300
AVG DAY DEMAND (GPD)	16,457	15,338
PEAK DAY DEMAND (GPD)	23,591	29,731
PEAKING FACTOR	1.43	1.94

An average peaking factor of 1.69 will be applied to the average day demand to provide the projected peak day demands.

Peak Day Demand = Average Day Demand X Peaking Factor
= 204 X 1.69
= 345 gpcd

The projected peak day demands for Cooke City are included in Table 6 below.

Table 6: Projected Cooke City Peak Day Demands

YEAR	PROJECTED POPULATION OF COOKE CITY	PEAK DAY DEMAND		
		GPCD	GPD	GPM
2024	79	345	27,255	19
2034	81	345	27,945	19
2044	83	345	28,635	20

Like the peak day demands, the peak hour demand represents the hour with the highest usage. The peak hour factor is defined in a similar way as the peak day factor, the ratio of the peak hour demand to the average hour demand. Since there is no available data to calculate the average hour demand a peak hour factor must be estimated. The peak hour factors generally range from 1.6 to 2 times the peak day demand. A peak hour factor of 2 times the peak day demand will be used to estimate the projected peak hour demands. The projected peak hour demands are included in the following table.

Table 7 – Projected Cooke City Peak Hour Demands

YEAR	PROJECTED POPULATION OF COOKE CITY	PEAK DAY DEMAND			PEAK HOUR DEMAND
		GPCD	GPD	GPM	GPM
2024	79	345	27,255	19	38
2034	81	345	27,945	19	39
2044	83	345	28,635	20	40

The water from the peak hour demand is not needed on a continual basis; any demand above the peak day demand is typically supplied by the storage facilities. As will be discussed later, Cooke City has adequate storage capacity.

The 2044 projected average and peak day demands for Cooke City are 16,916 gpd (12 gpm) and 28,635 gpd (20 gpm), respectively.

2.4 Evaluation of Existing Water Supply

2.4.1 Description of Existing System

Water is supplied to the Cooke City Water District system from three groundwater wells located approximately 1/3 of a mile west of town along Highway 212. Two of the wells are located on one site with the well house and are referred to as CCSW #1 and CCSW #2. The third well (CCSW #3) is located approximately 150’ further east towards Silver Gate. All three wells are plumbed into the existing wellhouse.

Drilled in 2009, CCSW #1 reaches a depth of 105 feet below ground surface (bgs), featuring a 10-inch steel casing down to 84 feet bgs. The well employs a tight-wind stainless steel screen with 0.005 foot opening sizes from 81 to 84 feet bgs with 4.1% total perforated area. From 84 to 104 feet bgs is a continues stainless steel screen with openings sized 0.130 feet with 52.8% perforated area. The well was grouted with cement to a depth of 20 feet bgs. Per the well log, the static water level is 21.6 feet bgs. The well was pump tested just after it was drilled. The well was pumped at 42 gallons per minute (gpm) for 26.5 hours and the water level dropped a total 46.8 feet during the test. The well has been declared by DEQ to be for public water supply. The well log is included in Appendix F. CCSW #1 has a 5 hp pump. During a site visit in March, 2024, the well was cycled and pumped at approximately 38 gpm. CCSW #1 is at least 7 years old. Per the 2002 Performance Engineering PER, the pumps were replaced in 2018 when the newer controls were installed. The wells run on controls from pressure gauges at the PRV. Radio telemetry is used for communications from the PRV back to the well house.

CCSW #2 was drilled in 2009 and reaches a depth of 201 feet below ground surface (bgs), featuring a 10-inch steel casing down to 110 feet bgs. The well employs a tight-wind stainless steel screen with 0.005 foot opening sizes from 107 to 110 feet bgs with a 4.1% area of perforation. From 110 to 130 feet bgs, is a continuous stainless steel screen with openings sized 0.160 feet with 58% total area perforated. Per the well log, the static water level is 15 feet bgs. The well was pump tested after being drilled. The well was pumped at 270 gallons per minute (gpm) for 29 hours and the water level dropped a total 53.2 feet during the test. The well has been declared by DEQ to be for public water supply. The well log is included in Appendix F. CCSW #2 has a 7.5 hp pump. During a site visit in March, 2024, the well was cycled and pumped approximately 179 gpm consistently. CCSW #2 is at least 7 years old. Per the 2002 Performance Engineering PER, the pumps were replaced in 2018 when the newer controls were installed. The wells run on controls from pressure gauges at the PRV. Radio telemetry is used for communications from the PRV back to the well house.

CCSW #3 was drilled in 2009 and reached a depth of 220 feet bgs, featuring a 10-inch steel casing down to 185 feet bgs. The well employs a tight-wind stainless screen with 0.005 foot opening sizes from 182 to 185 feet bgs with 4.1% total perforated area. From 185 to 194 feet bgs is a continuous stainless steel screen with openings sized 0.120 feet with 50.8% perforated area. Per the well log, the static water level is 13.6 feet bgs. The well was pump tested after being drilled. The well was pumped at 35.5 gallons per minute (gpm) for 27 hours and the water level dropped a total 145.5 feet during the test. The well has been declared by DEQ to be for public water supply. The well log is included in Appendix F. CCSW #3 has 5 hp pump. During a site visit in March, 2024, the well was cycled and pumped approximately 29 gpm consistently. CCSW #3 is at least 7 years old. Per the 2002 Performance Engineering PER, the pumps were replaced in 2018 when the newer controls were installed. The wells run on controls from pressure gauges at the PRV. Radio telemetry is used for communications from the PRV back to the well house.

It is understood that, the current programming is set up for the wells to "cycle" or take turns when the system needs water. One cycle, only pump #2 will turn on and supply the town as needed. The next cycle, wells #2 and #3 will turn on together. This keeps the system from over using one certain pump. When needed for fire flows or high water use situations, all pumps will turn on to keep up with the demand.

As stated above, all well outlet pipes converge in a well house located on the same site and CCSW#1 and CCSW#2. The well house is comprised of CMU block walls with a wood framed and metal sheeted roof. The well house is heated and houses meters and electronic controls for all three wells. A diesel-powered generator is equipped on-site as backup power for the wells.

The current water system has never required treatment. The Water District is currently in good standing with water testing requirements mandated by the Safe Drinking Water Act and Montana DEQ. A copy of the most recently available Water Quality Report is available in Appendix J.

The District is currently operating on a good standing water right but, the amount of water is temporarily set at 220 (total) gpm. The DNRC is working with the District to obtain 5 years of metered water use data before setting the amount of water available for use under the water right. In January 2024, the Water District filed an extension to complete the permit to appropriate water rights. Due to system leaks and inoperable water meters, the Water District was having a difficult time trying to obtain accurate readings on actual water usage. The Water District is working to obtain accurate water usage data for the year before completing a water rights application.

Figure 2 -Pump House #1

Figure 3 -Pump House #2

The District has a good water right for municipal use. Following is a summary of the water rights listed with the DNRC for the Cooke City Water District:

Table 8 – Summary of Water Rights

WATER RIGHT NUMBER	PURPOSE	POINT OF DIVERSION	FLOW RATE	UNIT	VOLUME (AC-FT)	PRIORITY DATE
43B 772-00	Municipal	Wells 1, 2, & 3	20	gpm	32.85	9/14/1933
43B 27244-00	Municipal	Wells 1, 2, & 3	200	gpm	36.15	4/16/1980

The District is currently using all three wells to provide water. The district currently has a water right for up to 220 gpm or 316,800 gpd total for all three wells. As stated above, the water right amount is temporary and pending five years of accurate metered water use data.

2.4.2 *Capacity Assessment*

As presented above, Cooke City's 2044 peak daily demand is estimated at approximately 28,635 gpd. Also, as presented above, the three wells in conjunction can produce approximately 250 gpm or 360,000 gpd. DEQ required that the system be analyzed with the largest well out of service; therefore, the system could provide 96,480 gpd with the largest well out of service. The wells have capacity to serve the projected population in 2044. Also, as presented above, Cooke City's 2044 yearly demand would be 6,174,340 gallons (2044 avg day demand times 365 days per year). The temporary water right includes approximately 22,487,100 gallons per year. Because the eventual water right will be based off of use data from the last five years, Cooke City has adequate water rights to service the projected population in 2044.

2.4.3 *Condition Assessment*

Per the 2020 Performance Engineering PER, the well pumps and controls were replaced in 2018. All other parts of the supply system are still the original from the 2007-2012 projects. Currently, the wells and controls are in good operating condition. The wellhouse building needs repair. The existing roof is starting to cave and buckle. Though not yet leaking, the roof will continue to deteriorate without immediate attention. Roof failure will lead to the destruction of the thousands of dollars of electronic control equipment, loss of supply to the town, and possible contamination of the water supply.

The well heads were not accessible during the time of this PER but, during a sanitary survey of the system conducted in 2021, it was recommended that all well heads receive immediate repair. The electrical conduit connections are cracked on all the well heads. It was recommended by DEQ that "permanent repairs to the electrical conduit connections to ensure there are no pathways for insects, dust, or other debris to potentially contaminate the well".

2.4.4 *Regulatory Assessment*

In 2021 the Montana Department of Environmental Quality completed the sanitary survey inspection. The results of the inspection found issues with the well heads. Per the survey "…permanent repairs to the electrical conduit connections to ensure there are no pathways for insects, dust, or other debris to potentially contaminate the well".

The 2021 Sanitary Survey is included in Appendix D.

2.5 Evaluation of Existing Storage

2.5.1 *Description of Existing System*

Prior to 2010, the Water District relied on two separate water tanks for its public water supply system. One tank was located east of town between the Soda Butte Spring (the town's original water source) and another 10,000 gallon galvanized water tank that was located northwest of town.

When the District built a new system in 2010, both of the existing tanks were abandoned and demolished. The 2010 project included installation of a new 150,000 gallon welded steel tank that is still in use today. Per original plans from Great West Engineering, the tank is lined and is supported by a concrete foundation. The tank is fitted with a galvanized steel ladder for access through a locked hatch at the top of the tank. The ground elevation at the current tank is approximately 7884.5' per the original design plans dated 2010. The tank is approximately 32' high (as measured from the foundation to the edge of the roof) with a 30' diameter. The tank is equipped with an internal mixer that is currently not operational.

Figure 4 -150,000 Gallon Tank

2.5.2 Capacity Assessment

According to DEQ-1, 7.0.1, "The minimum allowable storage must be equal to the average daily demand plus fire flow demand". The existing tank was sized based on water use calculations in a 2002 PER completed by Entranco. The consultant in the 2002 PER recommended a water tank be installed with a capacity of 213,000 gallons. Though not documented clearly why, the engineering plans for the 2009-2010 water system project called for a tank with a 150,000 gallon storage capacity. It is believed that at the time of construction, funding limited the required tank size of the town but this was never confirmed. Per the Water District website and verified by the operator, a 150,000 gallon tank was actually installed.

The average day demand has been calculated above for a planning period of 20 years (2044); and is 16,916 gallons.

To determine the fire flow demand, we contacted the Insurance Services Office, Inc (ISO) area representative and obtained the results of the latest ISO analysis and testing that was completed in 2020. The test results are included in Appendix H. According to the information presented in the ISO analysis, the largest needed fire flow is at the intersection of Eaton & Broadway, and requires 1,750 gpm at 20 psi. The ISO also takes into account the number of hydrants available to determine if a flow-rate is feasible under the current system. According to the report, the actual flow possible with the storage available would be 976 gpm. For this report, The 1,750 gpm flow rate will be analyzed to calculate required storage. According to ISO, this flow rate will be required for two hours. Therefore:

$$1{,}750\ gpm\ x\ 60\ minutes\ x\ 2\ hours = 210{,}000\ gallons\ for\ fire\ flow$$

$$210{,}000\ gallons\ (fire\ flow) + 16{,}916\ gallons\ (average\ day\ demand) = 226{,}916\ gallons\ of\ required\ storage$$

Per the analyses above, the town's storage tank is inadequate for the fire flows required by the ISO but, limitations of the community's storage tank hinder the possible flow. Although the tank cannot provide ISO Full Credit Condition, the operator and the District have indicated no concerns with the tank.

2.5.3 Condition Assessment

As mentioned previously, the 150,000 gallon tank was erected in 2010. The tank's outer structure is currently in good operational condition and is showing no signs of leakage. The concrete foundation and drains are currently in good working order.

The tank is equipped with a solar-powered mixer to prevent freezing and stratification of the water in the tank. The mixer broke during the winter of 2022, and is currently inoperable. The Water District is currently in the process of planning to replace and/or fix the existing mixer. The perimeter fence around the existing tank is currently down and in need of repair. Currently, the fence provides no protection from unauthorized access to the tank or vandalism.

The District operator is working on completing an O&M schedule and plans to inspect the tank once every year. The District contracted a tank inspection with Midco Diving in XXXXX. The results of the inspection was the inside of the tank ….

2.5.4 Regulatory Assessment (if applicable)

In 2021 the Montana Department of Environmental Quality completed the sanitary survey inspection. The results of the inspection found no significant issues with the tank itself but had recommendations for the perimeter fence repairs as follows:

> *Recommend repairing the perimeter fence around the storage facility to reduce the risk of unauthorized access or vandalism. Rob noted this is an annual issue due to snowpack, and so an upgraded fence may need to be considered to maintain security at the site.*

The 2021 Sanitary Survey is included in Appendix D.

2.6 Evaluation of Existing Distribution System

2.6.1 Description of Existing System

As outlined in section 2.4, all well outlet pipes converge in a well house located south of Highway 212, approximately 1/3 mile west of Cooke City. From the well house, one singular outlet pipe connects to a 6" transmission main running east along Highway 212 to Cooke City. The transmission main then travels north on Montana Street, then east on Broadway Street, thence, north again on Republic Street until reaching a pressure reducing vault (PRV) at the intersection of Black Street and Republic Street. The existing distribution main was built as part of the 2007 Beartooth highway project and was finished during the 2010 water systems improvement project. The transmission main is constructed entirely of 6" DR9 HDPE pipe. All fittings including valves, bends, and tees consist of cast iron construction.

The existing PRV is constructed of a 8'x12'x8' concrete manhole structure. The structure is equipped with a lockable insulated access hatch, access ladder, 4" floor drain, and gas vent pipe. Inside the structure, telemetry controls are wall mounted. A 10' antenna tower constructed of tubular steel is located next to the PRV for telemetry control communication between the PRV and well house.

From that PRV, the water is pumped uphill to the town's 150,000 gallon storage tank through a single water main. From the storage tank, the system's water flows downhill back to the pressure reducing vault. Electronic pressure meters are used within the PRV to calculate the amount of water in the storage tank. If the head pressure within the PRV calculates the water tank to be below a certain level, the system communicates to the pump house to turn on the pumps until the water tank is filled. Once full, the pumps are turned off and the system runs purely on hydrostatic head from the tank. The section of transmission main from the PRV to the tank is constructed of 8" DR18 PVC. All fittings including valves, bends, and tees consist of cast iron construction.

The PRV reduces system pressures from upwards of 135 psi down to approximately 65 psi using mechanical "Cla" valves. Two master valves feed the distribution system from the tank. One regular pressure (low-flow) and one high pressure (high-flow) The lower pressure valve feeds the system during normal operation while the high pressure valve feeds the system during a fire flow event.

Thence, from the PRV, the water is distributed through a water main network to all system users. The distribution system to the town consists of a variety of types and sizes of water main from a variety of projects throughout the year. A 2002 PER written by Entranco indicated the original water system was constructed in the 1950's and was added on to in the 60's, 70's and 80's. At that time, the system consisted of 3", 4" and 6" AC and PVC pipes. The 2010 water system rehabilitation project replaced much of the original system with 6" and 8" PVC. Records show that some of the water main within Highway 212 right-of-way was installed in 2007 as part of a Federal Highway Administration Project. A 2012 water main replacement project also replaced a section of water main in Broadway and Huston, north of Main Street. A schematic of the existing system is available in Appendix E.

In 2017 and 2018, the system pumps were updated with new programming. At the same time, all water meters were updated with advanced meter reading (AMR).

Table 9: Summary of Distribution Pipe

SIZE (in)	PIPE TYPE	STREET	YEAR INSTALLED	QUANTITY (ft)
6	PVC	MARTIN,SKUNK HOLLOW, BLACK	PRE-2007	1,319
6	HDPE	TRANSMISSION MAIN	2007, 2010	6,617
6	PVC	Multiple	2010, 2012	7,067
8	PVC	Multiple	2010	3,955

Some parts of the distribution system were not replaced as part of the 2010 project. Due to lack of records, installation date, size, and material of those sections is unknown. These sections of main are located on Martin Street and Skunk Hollow Road. Please see the schematic of the existing system included in Appendix E.

The distribution system consists of a single pressure zone. While water pressures are relatively consistent for most of the town, there have been complaints of low pressure at times of high use. It is believed that this is caused by large water users on single "dead-end" mains. Hotels, gas stations, or other commercial properties on the upstream end of the main are likely the cause of fluctuations in water pressure to properties downstream on the same main.

2.6.2 Capacity Assessment

To determine the fire flow demand, we contacted the Insurance Services Office, Inc (ISO) area representative and obtained results of the latest ISO analysis and testing that was completed in 2020. The test results are included in Appendix H. According to the information presented in the ISO analysis, the largest needed fire flow is at the intersection of Eaton & Broadway, requiring1,750 gpm at 20 psi. The ISO also takes into account the existing storage available to determine if a flow-rate is feasible under the current system. According to the report, the actual flow possible with the existing storage available would be 976 gpm.

2.6.3 Condition Assessment

According to the system's operator, the entire system is metered, and the meter's were replaced from 2017-2018. The current operator is currently working on documenting an O&M schedule. The current schedule includes exercising valves and hydrants yearly, visual tank inspections, annual required maintenance to broken meters, and other such jobs as needed.

Most of the system was replaced with updated PVC and HDPE pipe in 2007, 2010 and 2012 but, some of the original system remains. Though not certain due to lack of records, it is believed the original system consists primarily of aging PVC pipe. Portions of the system that pre-date the 2010 project, are currently experiencing freezing problems due to lack of bury depth and "dead-end" mains. A flush hydrant is installed on the end of the main at the southeast corner of the Water District boundary (Skunk Hollow Road). Per the operator, the flush hydrant runs on an electric timer system. Water wasted at the flush hydrant will be discussed later in this report.

Replacement of these aging mains and flush hydrants is included in the Water District's future plans. Water becomes stagnant in long dead-end mains, and to improve water quality the mains require looping. Looping water mains also provides alternate paths for water to reach the same destination, allowing the operator flexibility to isolate specific areas for repairs while limiting service interruptions. Other benefits of looping include increased fire flow through smaller mains because water is supplied from two directions. Other than minor breaks and some dead-end mains the distribution system is in good condition.

2.6.4 Regulatory Assessment (if applicable)

In 2021 the Montana Department of Environmental Quality completed a sanitary survey inspection. The results of the inspection found no significant issues with the distribution system. The 2021 Sanitary Survey is included in Appendix D.

2.7 Financial Status of Existing Facilities

The Cooke City Water District is currently serving four separate bonds for the rehabilitation projects that occurred over the past 15 years. The bond is set to expire in 2029. Currently, the Water District has no planned projects outside of this project. A summary of the Water District's income for the last three fiscal years is provided in the following table. A complete breakdown of the water system revenues, expenditures, debt service reserve, and rates are included in Appendix I.

Table 10 – Summary Water Revenues

YEAR	WATER METER INCOME	Average
2021	$83,310.26	$79,929.88
2022	$76,905.35	
2023	$79,574.04	

New meters were installed in 2017-2018 to better track the system's water usage. The meters provided an immediate benefit to tracking leakage within the system. The new meters also helped the Water District update its billing system to a base fee + consumption cost. Prior to the meters, the District billed based on a base rate plus charges for extra use. The updated billing system has resulted in higher revenues.

The current water rates for the Cooke City Water District are established at a base rate of $37.51 for the first 5,000 gallons of metered water with a tier system for additional water used after that. Rates for additional use can be found in Table 11 below.

Table 11 – Current Water Use Rates

USAGE (GALLONS)	ADDITIONAL COST	COST UNIT
5001-10,000	$0.65	PER 100 GALLONS
10,001-25,000	$0.80	PER 100 GALLONS
25,001-40,000	$1.00	PER 100 GALLONS
40,001-50,000	$1.15	PER 100 GALLONS
Over 50,000	$1.35	PER 100 GALLONS

Base rate and additional use costs are scheduled for increase in July, 2024 per an adopted resolution dated 06/18/2020. No increases beyond that date are currently planned. Because this project will occur after the proposed rate increase, an analysis was conducted to determine the approximate revenue at the implementation of the proposed increase. The proposed base rate will be increased to $39.39. Table 12 below shows the new rate structure and increase in costs.

Table 12 – Proposed Water Use Rates

USAGE (GALLONS)	ADDITIONAL COST	COST UNIT	% Increase	Average Increase
5001-10,000	$0.80	PER 100 GALLONS	23%	18%
10,001-25,000	$1.00	PER 100 GALLONS	25%	
25,001-40,000	$1.15	PER 100 GALLONS	15%	
40,001-50,000	$1.35	PER 100 GALLONS	17%	
Over 50,000	$1.50	PER 100 GALLONS	11%	

Because the District bills on a tiered basis, the relationship between user rates and income of the District is not linear. For this reason, it was required to calculate the average income based on average water consumption per user per month. User billing was then calculated based on the new rates above. Revenue after the increase was calculated to be $83,840.79. Because the project will occur after the rate increase, this number will be used for calculations later in this report.

The community does not currently have a sewer base rate because the proposed sewer system is not yet installed. Construction of the proposed system is currently planned for initiation in the summer of 2024. A 2022 PER update completed by Triple Tree Engineering estimated sewer base rates at the project's completion based upon the Montana Department of Commerce target rates.

The target rate is used to determine if a municipality is contributing fairly based on comparisons to other communities throughout the state. To apply for grant funding from the Montana Department of Commerce, user rates after completion of the project must meet or exceed the target rates.

Target rates are calculated as a percentage of the median income for the municipality. The percentages of median income are approximately 0.9 percent of the median household income for wastewater only, 1.4 percent of the median household income for water only, or 2.3 percent of the median household income for water and wastewater combined. The median household income for Cooke City, according to the 2019 census, was $36,875. According to the Montana Department of Commerce target rates for Cooke City are as follows:

Table 13 – Target Rates

SYSTEM	MEDIAN HOUSEHOLD INCOME	PERCENTAGE	MONTHLY TARGET RATE
WATER	$36,875	1.4%	$43.02
WASTEWATER	$36,875	0.9%	$27.66
COMBINED	$36,875	2.3%	$70.68

The LMI information and target rate data is included in Appendix B.

The water target rates are based on equivalent dwelling units (EDUs); therefore, it is necessary to calculate the community's existing rates based on EDUs. A 3/4-inch water service is a typical water service, and is considered 1 EDU. The EDUs for each water service are calculated by comparing the area of the service line to the area of a ¾ inch service line.

Per conversations with the District, it is believed that all of the existing water service lines are the same size even for commercial businesses. It has been discussed in the past whether the service sizes needed to be increased, but nothing has been changed since then. The current operator agreed that all water service lines are ¾". A map created by Great West Engineering only showed one 2" water service to the Super 8 in town. For this reason, all users will have assumed ¾" water service size except for the Super 8 which will be a 2". The total commercial and residential EDU's for Cooke City are summarized in the following table.

Table 14 – Equivalent Dwelling Units

SERVICE SIZE (INCHES)	EDU'S PER SERVICE SIZE	RESIDENTIAL		COMMERCIAL		TOTALS	
		# OF SERVICES	# OF EDU'S	# OF SERVICES	# OF EDU'S	# OF SERVICES	# OF EDU'S
3/4	1	96	96	0	0	96	96
1	1.79		0		0		0
1.5	4		0		0		0
2	7.14		0	1	7		7
TOTALS		96	96	1	7	96	103

The 2023 revenue from metered water sales was $79,574.04 (reference Appendix I).Using the planned rate increases, the estimated revenue will increase to $83,840.79/year, providing an average monthly residential metered water charge in 2023 of $6,986.73. The total number of EDU's in 2023 was 103; therefore, the 2023 water only rate per EDU was $67.83/EDU/month.

As discussed above, the Sewer District is currently working on a project planned to begin construction in the summer of 2024. Per a PER update completed by Triple Tree Engineering in 2022, the Sewer District plans on billing 150% of the target rate at the time of completion. The Sewer District must bill this rate as a stipulation to MCEP funding received for the upcoming sewer project. Assuming 150% of the current target rate, the sewer district will be billing $41.49

"Commerce utilizes the combined rates for both water and wastewater systems in its target rate analysis. This helps to ensure that an applicant's need for financial assistance is not understated if either of the systems has high rates, even though the other system may have relatively low rates." The combined water and wastewater rate at the completion of the sewer project will be $109.32/EDU/month. After the completion of the sewer project, the community will exceed the target rate for both sewer and water of $70.68/EDU/month; therefore, the water district is eligible for grant funding through the Montana Department of Commerce.

2.8 Water/Energy/Waste Audits

There have been no official water, energy, or waste audits completed in recent years. The GWUDISW, SWDAR, and Sanitary Survey reports are included in Appendix F.

Per the 2020 wastewater PER completed by Performance Engineering:

> *In 2017, the Cooke City Water District installed advanced automatic meter reading (AMR) equipment on every customer's meter. Consumption data is automatically collected and transferred to the data cloud where it is analyzed*

with algorithms to identify possible water system leaks. These reports are regularly reviewed by District leadership and investigated by staff. Customers are notified of leaks and reminded that they are financially responsible for all water which passes through their meter. Almost universally, customers promptly repair leaks. This common-sense approach has been hugely successful in reducing lost water with one customer cutting "consumption" from 2,200 gallons per day to 120 gallons per day.

The Water District has continued to make a conscious effort to decrease water waste within the system for the last seven years.

3 NEED FOR PROJECT

3.1 Summary of Problems

Problems within the existing water system were discussed in Chapter 2. A summary of the problems is as follows:

- The existing well house roof is starting to fail, and needs repaired or replaced. Cracking of electrical conduit on well heads requires maintenance.
- The system's water tank mixer and fence are currently broken and in need of repair.
- Dead-end mains with and without a flush hydrant are present within the system leading to freezing, low-pressure, restricted fire flow, stagnation of water and waste of water.

3.1.1 Supply

Condition

The existing well pumps were replaced in 2018 and are currently in good operating condition. The system controls were replaced around the same time. All existing piping for the well house is also in good operating condition.

The well house roof is currently failing and buckling on the east side of the building. If the roof fails, it could lead to the destruction of thousands of dollars of equipment, loss of supply of water to Cooke City, and possible contamination of the supply system.

The 2021 sanitary survey by DEQ noted cracking of electrical connection conduit at the well heads. It is possible for these cracks to act as a pathway for contamination of the wells.

3.1.2 Storage

The community storage tank was installed 2010 and is currently in good working condition. The tank mixer however, is currently damaged and in need of repair or replacement.

Without the mixer, the town's tank runs the risk of stratification and freezing. Freezing can be very concerning for a lined tank. Ice that forms at the top of the tank can tear a liner and cause a leak in the water tank. Any tear in the liner could also be a possible route for contamination of the town's drinking water.

The town contracted a tank inspection with Midco Diving in September of 2017. The result of the inspection was the inside of the tank needs to be sandblasted and recoated. The town is in the process of recoating the interior of the tank.

3.1.3 Distribution

The existing distribution system consists of a variety of pipe materials and sizes from various projects throughout the years. Most of the system was replaced in 2007, 2010 and 2012. Some segments of the original main are still active in town with no record of initial service. Dead end and aging mains exist throughout the distribution system.

The distribution system experiences freezing and low-pressure in areas of service with dead-end mains. An automated water flush hydrant is used on one section of the original distribution main in Skunk Hollow.

3.2 Health, Sanitation & Security

Health and safety of the public is by far the largest concern of any community water system. The Cooke City Water District has deficiencies within the water system that could compromise health and safety of the public. The proposed improvements to the pump house, well heads, and storage tank are the biggest health concerns; therefore, are the highest priority.

3.2.1 Supply

The condition of the pump house roof will continue to deteriorate until failure. Roof failure could lead to the destruction of thousands of dollars in electronic controls, loss of supply to the community, and possible contamination of the water supply. The current roof condition does not pose an immediate health and safety concern but could at some point. MT DEQ requires all pumping stations to "be durable construction, fire and weather resistant, and with outward-opening doors;" per DEQ Circular-1 standard 6.2.C. Roof failure would hinder the system from meeting this requirement.

In 2021 DEQ conducted a sanitary survey of the water system. In the notes of the survey, it was recommended that all of the existing well heads receive immediate repair. The electrical conduit connections are cracking on all the well heads. It was recommended by DEQ that "permanent repairs to the electrical conduit connections be completed to ensure there are no pathways for insects, dust, or other debris to potentially contaminate the well". The MT DEQ sanitary survey is included in Appendix D.

3.2.2 Storage

The storage tank is a critical component of any water system. Any failure to the tank would result in a complete system shutdown, resulting in a public health and safety concern. The storage tank is equipped with a solar-powered mixer to prevent freezing and stratification of the water in the tank. The mixer broke during the winter of 2022 and is inoperable. MT DEQ Circular-1 Section 7.0.6 Stored Water Age states the following:

> *Finished water storage designed to facilitate fire flow requirements and meet average daily consumption should be designed to facilitate turnover of water in the finished water storage to minimize stagnation and stored water age. Consideration should be given to separate inlet and outlet pipes, mixing, or other acceptable means to avoid stagnation and freezing. Poor water circulation and long detention times can lead to*

loss of disinfection, residual, microbial growth, formation of disinfectant byproducts, taste and odor problems, and other water quality problems.

If the tank freezes, ice jams at the top of the tank could drop with the water level of the tank. As this happens, there is potential to tear the tank liner causing leakage. Tears in the liner could also be a route for possible contamination. The Water District is currently in the process of planning replacement and/or repair of the existing mixer but does not have the necessary funds for the project.

The perimeter fence around the existing tank is currently down and in need of repair. Currently, the fence provides no protection from unauthorized access to the tank for vandalism. The 2021 sanitary survey conducted by MT DEQ included recommendations to repair the downed fence as follows:

Recommend repairing the perimeter fence around the storage facility to reduce the risk of unauthorized access or vandalism. Rob noted this is an annual issue due to snowpack, and so an upgraded fence may need to be considered to maintain security at the site.

It was noted in the same report that past repairs have been attempted but heavy snow destroys the fence every winter. Attempts to maintain the fence have therefore been stopped by the district. The 2021 Sanitary Survey is included in Appendix D.

3.2.3 Distribution

Dead end mains exist throughout the distribution system. MT DEQ Circular-1 states the following regarding dead ends:

a. … Dead ends must be minimized by using appropriate tie-ins whenever practical.
b. Where dead-end mains occur, they must be provided with a fire hydrant if flow and pressure are sufficient, or with an approved flushing hydrant or blow-off for flushing purposes…

Eight dead-end mains exist in the system, five of which are equipped with hydrants at the end of the main. The dead end main located at the southeast corner of the Water District boundary is equipped with a flush hydrant. The flush hydrant is an electronically operated valve that operates on a timer system. Water loss at this point of the system will be discussed later in section 3.3 of this report. Low pressure complaints and freezing have both occurred as a result of the dead-end mains.

3.3 Aging Infrastructure

The majority of the water system is relatively new. Major water system rehabilitation projects in 2007, 2010 and 2012 replaced most of the original system with new PVC pipe. Some segments of main pre-dating the 2010 project still exist and are currently in operation. The exact date of construction is unknown, but it is assumed that these lines were installed in the mid 1980's during the community's last major water system project. The dead end mains within the system are located in areas where the original system remains. As discussed earlier in this report, freezing and low pressures have been a problem throughout the years. Also, one of the dead-end mains is equipped with a flush hydrant as described earlier. The flush hydrant is set to turn the valve on at 4 am every day for 5 mins. Assuming the hydrant is operating at 50 gpm, the current flush hydrant wastes approximately 250 gallons per day or 91,250 gallons per year. At this rate, the flush hydrant accounts for 2% of the total water usage in the entire system.

3.4 System Operation and Maintenance

The Water District contracts an independent part-time operator to operate and maintain the existing system. Currently the owner of the company oversees all O&M of the system and is training two additional part-time operators to assist in the duties. Cooke City's water system is very well maintained. Some of the yearly O&M requirements include, meter replacement, leak repairs, meter reading, and exercising of valves and hydrants. The town is entirely metered and equipped with a radio read system which requires very little time to populate monthly meter readings required for billing purposes. The town's metering system is working very well.

3.5 Reasonable Growth

The 2044 population is projected to be 83 based on census information over the last decade. However, the usage in the Cooke City water system is primarily dependent on the amount of visitors the community will host throughout the year. Using the average rate of increase in visitors from 2013 to 2023, the expected number of visitors at the end of the planning period 2044 can be calculated. Table 2 below shows this calculation.

Table 2 Continued – NE Entrance Visitors

Year	Park Visitors at NE Entrance	Percent Change
2013	190,002	
2014	204,486	7.08%
2015	230,859	11.42%
2016	228,040	-1.24%
2017	222,440	-2.52%
2018	223,758	0.59%
2019	239,830	6.70%
2020	219,975	-9.03%
2021	290,457	24.27%
2022	45,424	-539.44%
2023	270,991	-7.18%
Average Increase Per Year		3.34%
2044	540,247	3.34%

Per the table above, visitation to the park through Cooke City is expected to double by the end of the planning period. It would be unrealistic to assume that Cooke City's amenities would see double the people total by that time. Limitations in actual infrastructure (shops, hotels, and rentals) will be the deciding factor but, it is worth noting that the system will be affected by these new demands.

Also, the Water District is planning to expand service to properties within the boundaries that are currently unserved. Existing concerns of low-pressure and freezing have kept the district from pursuing these connections. The long-term goal for the Water District is to serve all properties within the existing District boundary. These service additions will lead to increased revenue, a more consolidated water system, and a stronger cash-flow base to support the ever-increasing amount of tourism that many residents in Cooke City rely on for income.

4 ALTERNATIVES CONSIDERED

4.1 Summary of Problems

Problems within the existing water system were discussed in Chapter 2. A summary of the problems is as follows:

- The existing well house roof is starting to fail and needs repaired or replaced.
- The system's water tank mixer is currently broken and in need of repair.
- Dead-end mains with and without a flush hydrants are present within the system; leading to freezing, low-pressure, restricted fire flow, stagnation of water, and waste of water.

The current issues plaguing the distribution system have created reluctance within the Water District to accommodate additional users within its existing boundaries. While one of the District's long-term objectives is to extend services to more properties within the community, this goal is hindered by the prevailing problems within the system. Addressing and resolving these existing issues is essential to fulfill the District's expansion goals and meet the growing demand for water services within the community.

A preliminary examination of possible system alternatives allows a broad approach to ultimate selection, thus ensuring adequate consideration of all feasible alternatives. Following the preliminary screening process, selected alternatives undergo a more detailed analysis, with the most viable alternatives being subject to a detailed design analysis and cost estimate.

Development of optimized improvements to facilities can be a complex process. A preliminary consideration in this process includes the cost of the improvements, including initial and future capital costs and annual reliability and flexibility, and process energy and resource requirements. These factors must be considered together to determine the best alternative for fulfilling community goals.

Regardless of the alternative selected, certain improvements are necessary to the storage tank and the pump house building, and are the only solution to the problem. Therefore the following improvements will be included in the final project but will not impact alternative selection; and have been excluded from the alternative analysis.

1. Repair and replace portions of the pump house roof and well heads.
2. Repairs to the storage tank mixer.

The problems with the existing water supply and storage system will be addressed with the bulleted improvements, therefore the following alternatives have been developed for consideration to address the problems with the town's distribution system.

4.2 Alternative 1- No Action

Description

This alternative includes taking no action to address the existing problems with the distribution system. The existing system would continue to freeze as it has in the past.

During times of high water demand, downstream properties will continue to experience low pressure. Also, existing system leaks and flush hydrants would continue causing unnecessary use of electricity, waste of potable drinking water, and exposing the system to possible contamination.

Design Criteria

No additional design requirements are necessary if no action is taken.

Map

A schematic of the existing system is included in Appendix E.

Environmental Impacts

There would be no additional environmental impacts from the no action alternative.

Land Requirements

This alternative would require no additional land acquisition for development.

Potential Construction Problems

No construction is required for this alternative.

Sustainability Considerations

Continued reliance on the existing dead-end mains will exacerbate water and energy waste. Dead-end mains, particularly those fitted with hydrants, require periodic flushing to remove stagnant water. One dead-end main, outfitted with a flush hydrant, is particularly problematic, leading to waste of thousands of gallons of potable water annually. Section 3.3 of this report highlights that this single flush hydrant alone is estimated to waste up to 91,250 gallons per year, equivalent to approximately 2% of the total water consumption within the entire system. Addressing these inefficiencies is critical to mitigate water and energy losses and enhance the overall sustainability of the water distribution system.

Cost Estimates

This alternative would not require additional infrastructure costs, but would continue to impact the O&M costs caused by the existing dead-end mains.

4.3 Alternative 2 – Additional Flush Hydrants

Description

This alternative would include installation of flush hydrants on all dead-end mains within the existing system. The proposed valves will be very similar to the existing located at the end of the Skunk Hollow Road dead-end main.

Design Criteria

The purpose of this alternative would be to satisfy MT DEQ Circular-1 Section 8.2.4.b which reads as follows:

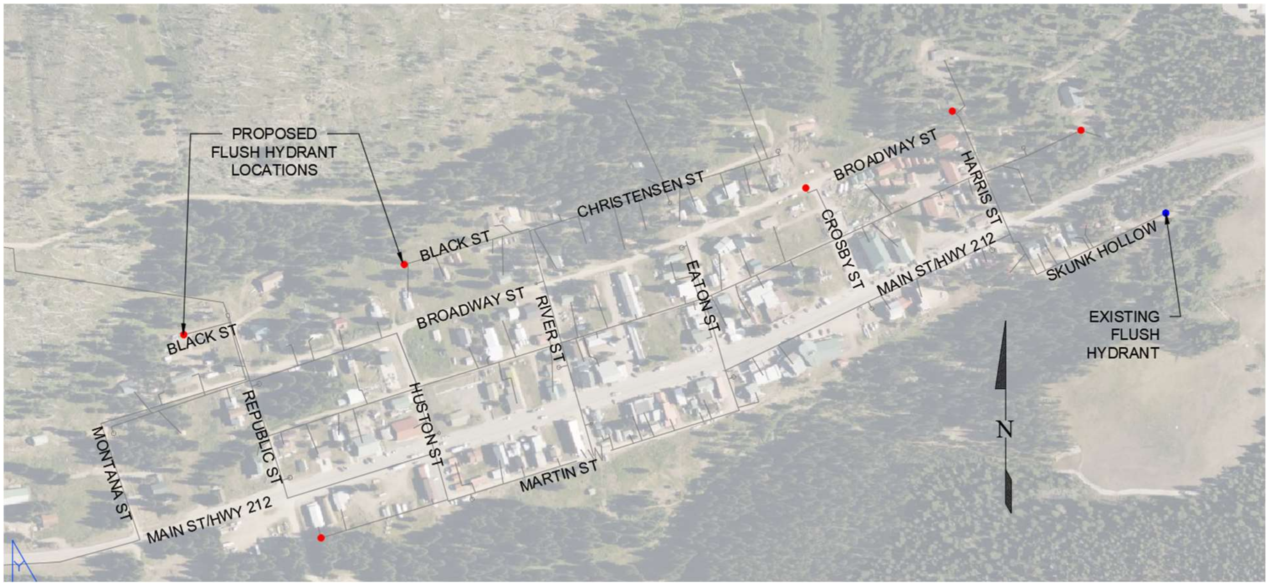
> *Where dead-end mains occur, they must be provided with a fire hydrant if flow and pressure are sufficient, or with an approved flushing hydrant or blow-off for flushing purposes…*

Of the eight total dead-end mains located throughout the system, five are equipped with fire hydrants at the end of the line and one of those has an actual purpose-built flushing hydrant.

Map

Following is a schematic of this alternative.

Figure 5 – Alternative 2 Proposed Flushing Hydrants



Environmental Impacts

Adverse environmental impacts are not expected with implementation of this alternative. All work would be limited to the existing community ROW, and all work is in areas that have been previously impacted, constructed upon, and disturbed. We do not anticipate impacts to previously undisturbed areas, wetlands, or other areas of environmental concern.

Land Requirements

We do not anticipate the need for additional land for the implementation of this alternative. All work is limited to inside of existing ROW, in existing roads and streets.

Potential Construction Problems

Cooke City faces several challenges due to its geographical and relative isolation. Firstly, being situated high in the Rocky Mountains, concerns about subsurface rock arise whenever excavation is involved. While this alternative mainly focuses on areas already disturbed from previous projects, this concern cannot be entirely overlooked.

Secondly, Cooke City's remote location poses a significant challenge to construction efforts. Unlike projects in more populated areas, those working in Cooke City lack easy access to miscellaneous materials that may be needed throughout the construction process. Consequently, contractors must plan ahead and stockpile a diverse range of supplies to ensure uninterrupted progress. For this reason, construction costs within Cooke City can be considerably higher than expected. Special provisions will be made to account for this in the cost estimate.

Lastly, considering that the majority of Cooke City's economy hinges on summer tourism, the construction project will unavoidably overlap with the peak tourist season. With construction activities likely to cause disruptions, traffic congestion, noise, and dust, it is imperative for the contractor to prioritize minimizing inconveniences. While temporary disruptions are anticipated during construction, proactive communication and thorough preparation will be vital to ensure a welcoming environment for both residents and visitors during the busiest time of the year.

Sustainability Considerations

As explained in Alternative 1, dead-end mains fitted with hydrants, require periodic flushing to remove stagnant water. One existing dead-end main, outfitted with a flush hydrant, is sustainably problematic, leading to waste of thousands of gallons of potable water annually. Section 3.3 of this report highlights that this single flush hydrant alone is estimated to waste up to 91,250 gallons per year. If we apply the same amount of waste to an additional six flushing hydrants, the following additional waste is anticipated:

$$91{,}250\ gallons \times 6\ additional\ hydrants = 547{,}500\ additional\ gallons$$

That's over ½ million gallons of additional wasted water with the implementation of this alternative. Most importantly, this amount will be added on to what is already being lost in existing system leaks, existing flush hydrants, and private service leaks.

Cost Estimates

The following cost estimate has been established for comparison purposes to other viable distribution system alternatives. The cost estimate includes a 20% contingency and 20% engineering as well for total project costs. Mobilization has also been increased to 25% instead of 8% due to the location of the community.

Table 15 – Alternative 2 Cost Estimate

Alternative 2 Construction Cost Estimate						
Project		**Item**	**Unit**	**Quantity**	**Unit Cost**	**Total**
Alternative 2 Costs	**General Requirements**	General Requirements (assumed 25% mobilization, bond, insurance etc.)	LS	1	$30,947	$30,947
		Traffic Control	LS	1	$10,000	$10,000
		General Requirements Total Costs				**$40,947**
	Flushing Station Installation	Flushing Station	EA	6	$11,378.93	$68,274
		Installation	EA	6	$5,689.47	$34,137
		Temporary Water	LS	1	$11,379	$11,379
		Flushing Station Total Costs				**$113,789**
Alternative 2 Construction Cost						$154,737
15% Contingency						$30,947
Alternative 2 Total Construction Costs						**$185,684**
Engineering (Assumed 20% of Total Construction)						$37,137
Total Cost (2027)						**$222,821**

The current flush hydrant currently experiences minimal to no operation and maintenance (O&M) costs. Costs related to minor leak repairs and upkeep have been inconsequential for the District. Therefore, the operation and maintenance of additional system flush hydrants will not be factored into consideration for this alternative.

4.4 Alternative 3 – Replace & Upsizing Existing Mains

Description

This alternative would include replacement of the existing dead-end mains in the alley between Main and Broadway, and Skunk Hollow Road with new larger diameter PVC. Due to the nature, location, and timing of the complaints, it is also assumed that the low pressures are a product of high-water demand in areas of dead-end mains. A larger main would be sufficient to meet high-water demand.
The replacement of the mainline will also include installation of flushing hydrants.

Design Criteria

The basis of this design would include up-sizing of dead-end mains to meet requirements of high-flow periods during the summer months. MT DEQ Circular-1 lays out standards regarding pressure for public water systems. Section 8.2.1 states:

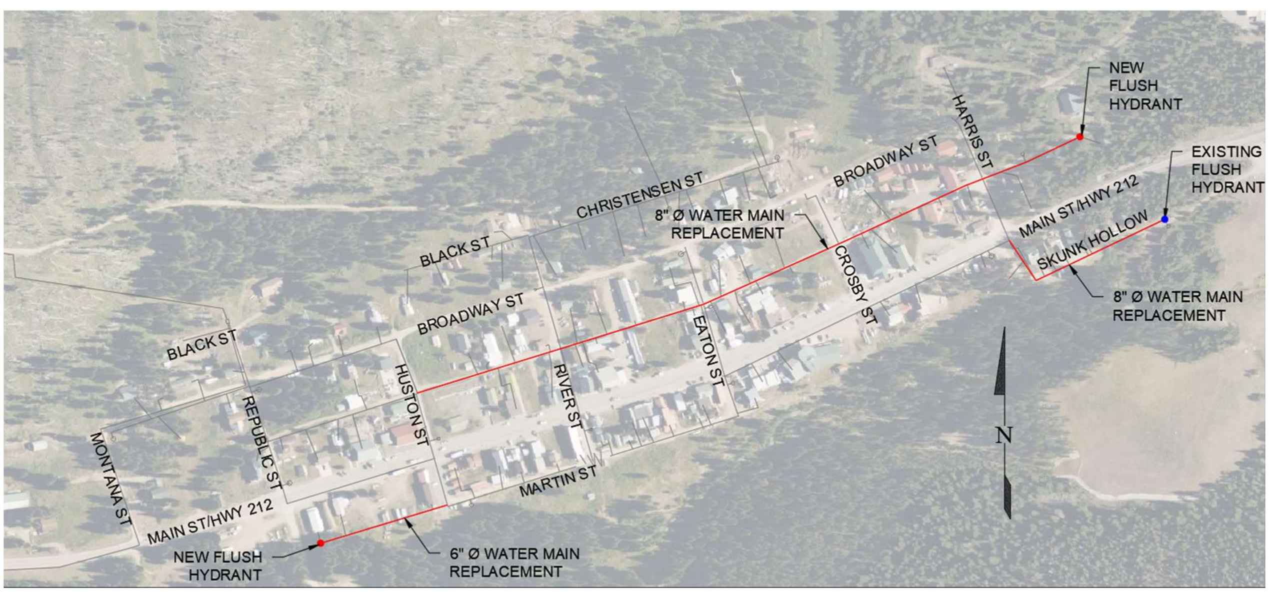
> *…The system must be designed to maintain a minimum normal working pressure of 35 psi. Minimum pressure under all conditions of flow (e.g. fire flows, hydrant testing, and water main flushing) must be 20 psi…*

The working pressure when complaints were made were never taken but, it can be assumed that pressures exceeding 35 psi would not have resulted in complaints.

Map

Following is a schematic of this alternative.

Figure 6 – Alternative 3 Dead-End Main Replacement



Environmental Impacts

Adverse environmental impacts are not expected with the implementation of this alternative. All work would be limited to the existing community ROW and all work is in areas that have been previously impacted, constructed upon, and disturbed. We do not anticipate impacts to previously undisturbed areas, wetlands, or other areas of environmental concern.

Land Requirements

We do not anticipate the need for additional land for implementation of this alternative. All work is proposed within existing right-of-way in existing roads and streets.

Potential Construction Problems

Cooke City faces several challenges due to its geographical location. Firstly, being situated high in the Rocky Mountains, concerns regarding subsurface rock arise whenever excavation is involved. While this alternative mainly focuses on areas already disturbed from previous projects, this concern cannot be entirely overlooked.

Secondly, Cooke City's remote location poses a significant challenge to construction efforts. Unlike projects in more populated areas, those working in Cooke City lack easy access to miscellaneous materials that may be needed throughout the construction process. Consequently, contractors must plan ahead and stockpile a diverse range of supplies to ensure uninterrupted progress. For this reason, construction costs within Cooke City can be considerably higher than expected. Special provisions will be made to account for this in the cost estimate.

Lastly, considering that the majority of Cooke City's economy hinges on summer tourism, the construction project will unavoidably overlap with the peak tourist season. With construction activities likely to cause disruptions, traffic congestion, noise, and dust, it is imperative for the contractor to prioritize minimizing inconveniences. While temporary disruptions are anticipated during construction, proactive communication and thorough preparation will be vital to ensure a welcoming environment for both residents and visitors during the busiest time of the year.

Sustainability Considerations

Mains that are being replaced will be fitted with flushing hydrants as required in MT DEQ Circular-1. As was highlighted in Section 3.3 of this report, the one existing flushing hydrant is estimated to waste approximately 91,250 gallons per year. If we apply that same amount of waste to the additional two flushing hydrants the following waste is anticipated:

$$91{,}250 \; gallons \times 2 \; additional \; hydrants = 182{,}500 \; gallons$$

An additional 182,500 gallons of additional wasted water is anticipated at the implementation of this alternative. Most importantly, this amount will be added to what is already being lost in existing system leaks, existing flush hydrants, and private service leaks.

Cost Estimates

The following cost estimate has been established for comparison purposes to other viable distribution system alternatives. The cost estimate includes a 20% Contingency and 20%

engineering as well for total project costs. Mobilization has also been increased to 25% instead of 8% due to the location of the community as discussed above.

Table 16 – Alternative 3 Cost Estimate

Alternative 3 Construction Cost Estimate						
Project		**Item**	**Unit**	**Quantity**	**Unit Cost**	**Total**
Alternative 3 Costs	General Requirements	General Requirements (assumed 25% mobilization, bond, insurance etc.)	LS	1	$204,668	$204,668
Alternative 3 Costs	General Requirements	Traffic Control	LS	1	$25,000	$25,000
Alternative 3 Costs	General Requirements	**General Requirements Total Costs**				**$229,668**
Alternative 3 Costs	Additional Work	Existing Water Main Demo	LF	3175	$26	$81,288
Alternative 3 Costs	Additional Work	Road Restoration	SY	3083	$17.07	$52,628
Alternative 3 Costs	Additional Work	Yard Restoration	SY	600	$14	$8,193
Alternative 3 Costs	Additional Work	**Additional Work Total Costs**				**$142,109**
Alternative 3 Costs	New Water Main	8" C900 PVC Pipe	LF	2200	$119.48	$262,853
Alternative 3 Costs	New Water Main	6" C900 PVC Pipe	LF	975	$106.68	$104,011
Alternative 3 Costs	New Water Main	8"x6" MJ Cross	EA	3	$2,845	$8,534
Alternative 3 Costs	New Water Main	8" MJ Tee	EA	1	$2,276	$2,276
Alternative 3 Costs	New Water Main	8"x6" MJ Tee	EA	3	$2,162	$6,486
Alternative 3 Costs	New Water Main	8" MJ Gate Valve	EA	10	$7,169	$71,687
Alternative 3 Costs	New Water Main	6" MJ Gate Valve	EA	3	$4,552	$13,655
Alternative 3 Costs	New Water Main	Fire Hydrant Assembly	EA	3	$14,224	$42,671
Alternative 3 Costs	New Water Main	**New Water Main**				**$512,173**
Alternative 3 Costs	Water Main Additional Work	Service Re-Connect	EA	40	$1,138	$45,516
Alternative 3 Costs	Water Main Additional Work	Connection to Existing Main	EA	10	$5,689	$56,895
Alternative 3 Costs	Water Main Additional Work	Flush Hydrants	EA	2	$17,068	$34,137
Alternative 3 Costs	Water Main Additional Work	Existing Flush Hydrant Hookup	EA	1	$2,845	$2,845
Alternative 3 Costs	Water Main Additional Work	**Water Main Additional Work**				**$139,392**
Alternative 3 Construction Cost						$1,023,342
20% Contingency						$204,668
Alternative 3 Total Construction Costs						**$1,228,010**
Engineering (Assumed 20% of Total Construction)						$245,602
Total Cost (2027)						**$1,473,612**

Because this alternative only replaces areas of existing main, it is assumed that no additional O&M costs will be present to the Water District. Therefore, the operation and maintenance of additional system flush hydrants will not be factored into consideration for this alternative.

4.5 Alternative 4 – Existing Water Main Looping

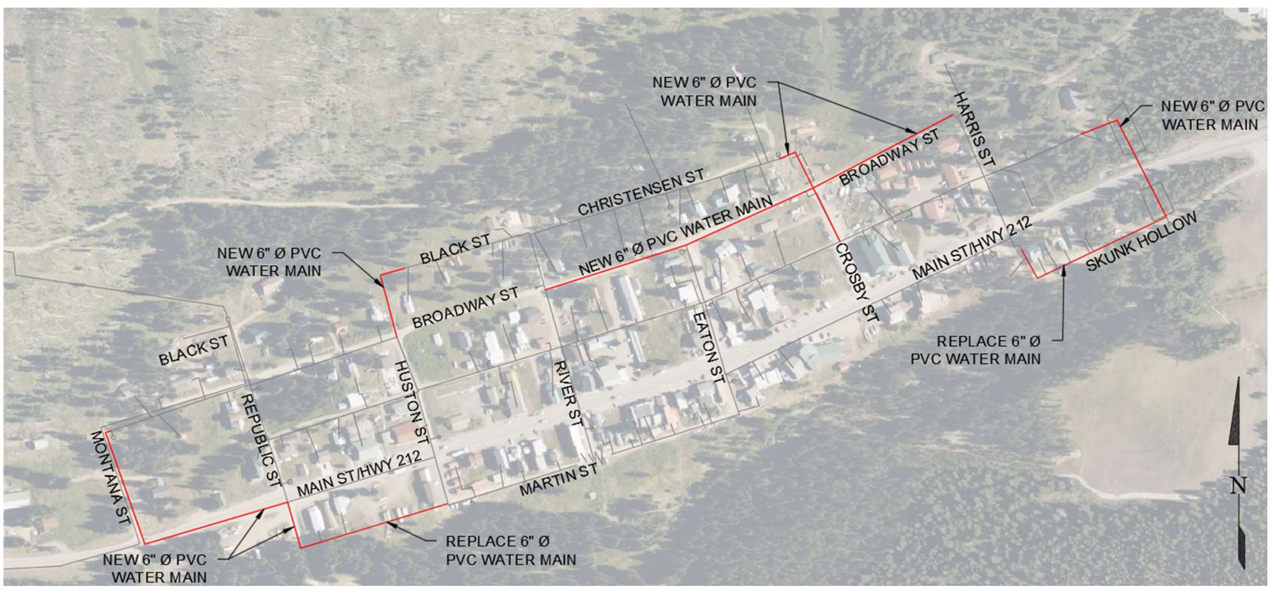
Description

This alternative includes construction of new water mains to loop the existing system, thereby eliminating dead-end mains. While many of the existing dead-ends are already equipped with tee fittings for potential tie-ins, new fittings will be installed where necessary. Additionally, gate valves will be employed to isolate sections of the mainline during construction activities. Furthermore, this alternative encompasses replacement of aging and shallow water mains in Skunk Hollow and Martin Street. However, the implementation of this alternative will necessitate land acquisition to facilitate the construction of the looping mains and connections.

Map

Following is a schematic for this alternative.

Figure 7 – Alternative 4 Existing Water Main Looping



Environmental Impacts

This alternative will require land acquisition along an existing property line for the Crosby Street Main. Both bordering lots are currently developed with residential structures. Because the lots are currently developed, no adverse environmental impacts are expected for that section of main. Other work for this alternative would be limited to existing community right-of-way in areas that have been previously impacted, constructed upon, and disturbed.

One section of water main on Martin Street borders an existing Zone A floodplain. If this section of main will require construction within the floodplain, a County floodplain permit will be required.

Land Requirements

This proposed alternative will require land acquisition for the northern most section of the proposed Crosby Street Main. Approximately 30' of utility easement will be required by at least one landowner. Based on discussions with the District, one of the current landowners would like to connect to the existing system and is likely to work with the District to more easily access the system.

All other proposed sections of mainline are proposed for construction within existing ROW in existing roads and streets.

Potential Construction Problems

Cooke City faces several challenges due to its geographical location. Firstly, being situated high in the Rocky Mountains, concerns regarding subsurface rock arise whenever excavation is involved. Since almost all of the proposed project is located in areas without existing underground utilities, a geotechnical investigation will be required prior to construction.

Secondly, Cooke City's remote location poses a significant challenge to construction efforts. Unlike projects in more populated areas, those working in Cooke City lack easy access to miscellaneous materials that may be needed throughout the construction process. Consequently, contractors must plan ahead and stockpile a diverse range of supplies to ensure uninterrupted progress. For this reason, construction costs within Cooke City can be considerably higher than expected. Special provisions will be made to account for this in the cost estimate.

Lastly, considering that the majority of Cooke City's economy hinges on summer tourism, the construction project will unavoidably overlap with the peak tourist season. With construction activities likely to cause disruptions, traffic congestion, noise, and dust, it's imperative for the contractor to prioritize minimizing inconveniences. While temporary disruptions are anticipated during construction, proactive communication and thorough preparation will be vital to ensure a welcoming environment for both residents and visitors during the busiest time of the year.

The Skunk Hollow section of main will have it's own set problems. Directional drilling and/or jack and bore will likely be required to cross Highway 212 and cross Miller Creek. Besides the complications of the jack and bore itself, these crossings will also require extra permitting during the design phase of the project. The Skunk Hollow section will also require a substantial amount of clear and grubbing with tree removal.

Sustainability Considerations

This alternative will replace the existing flushing hydrant and mitigate the need for additional flushing hydrants. As discussed earlier, the exiting flushing hydrant currently wastes approximately 91,250 gallons of water a year. Therefore, this alternative will save that amount of water each year.

With reference to the other alternatives, Alternative 2 is expected to waste a total of 665,750 gallons of water and Alternative 3 is expected to waste 273,750 gallons of water. Again, this alternative would have the most positive impact on waste as it does not require installation of any flushing hydrants.

Cost Estimates

The following cost estimate has been established for comparison purposes to other viable distribution system alternatives. The cost estimate includes a 15% Contingency and 20% engineering as well for total project costs. Mobilization has also been increased to 25% instead 8% due to the location of the community.

Table 17 – Alternative 4 Cost Estimate

Alternative 4 Construction Cost Estimate						
Project		Item	Unit	Quantity	Unit Cost	Total
Alternative 4 Costs	General Requirements	General Requirements (assumed 25% mobilization, bond, insurance etc.)	LS	1	$223,776	$223,776
		Easement Adquisition	LS	1	$20,000	$20,000
		Traffic Control	LS	1	$45,000	$45,000
		General Requirements Total Costs				**$288,776**
	Additional Work	Existing Water Main Demo	LF	927	$26	$23,734
		Clear & Grubbing (Timber)	AC	0.4	$17,068	$6,827
		Gravel Road Restoration	SY	2789	$17	$47,602
		Asphalt Road Restoration	SY	167	$154	$25,603
		Yard Restoration	SY	1113	$14	$15,202
		Additional Work Total Costs				**$118,968**
	New Water Main	6" C900 PVC Pipe	LF	4367	$106.68	$465,861
		6" MJ Tee	EA	4	$108	$432
		6" MJ 90° Elbow	EA	5	$1,365	$6,827
		6" MJ Cross	EA	1	$2,560	$2,560
		6" MJ Gate Valve	EA	16	$4,552	$72,825
		8"x6" MJ Cross	EA	1	$2,845	$2,845
		New Water Main				**$551,350**
	Water Main Additional Work	12" Jack & Bore	LF	50	$1,706.84	$85,342
		Directional Drill (Pipe Included)	LF	50	$568.95	$28,447
		Service Re-Connect	EA	3	$1,138	$3,414
		Connection to Existing Main	EA	11	$5,689	$62,584
		Water Main Additional Work				**$179,787**
Alternative 4 Construction Cost						$1,138,882
20% Contingency						$227,776
Alternative 4 Total Construction Costs						**$1,366,658**
Engineering (Assumed 20% of Total Construction)						$273,332
Geotechncial Investigation						$30,000
Total Cost (2027)						**$1,669,990**

While this alternative involves the addition of pipe to the existing system, it is not anticipated to increase O&M costs for the District. Presently, maintenance expenses for the distribution system primarily revolve around flush hydrant inspection and upkeep, the exercising of system valves and fire hydrants, and rectification of existing water services. Notably, this alternative eliminates all flushing hydrants, excludes installation of new fire hydrants, and does not encompass introduction of new services. Although the District aims to integrate new users into this system in the future, new services are not included in the scope of this project.

5 SELECTION OF AN ALTERNATIVE

5.1 Life Cycle Cost Analysis

When comparing alternatives, the cost-effectiveness determined from the monetary present-worth analysis, is considered the single most important comparison parameter. This economic comparison includes estimated capital cost expenditures and annual O&M costs.

The cost estimates presented, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project and resulting feasibility will depend on actual site conditions, final project scope, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of these factors, project feasibility, benefit/cost ratios, risk, and funding needs must be carefully reviewed prior to making specific financial decisions or re-establishing project budgets to help ensure proper project evaluation and adequate funding.

Economic evaluations of the alternatives require consideration of annual O&M costs as well as capital costs. O&M expenses include labor, energy, process chemicals if any, maintenance materials and supplies, residuals disposal if any, etc. Labor estimates for new facilities are typically based primarily on published references or labor requirements at other facilities familiar to the Engineer. Energy costs for new facilities are based on estimates of the average requirements for each unit process using local utility rates. Equipment maintenance costs for new facilities are based on a percentage of the initial equipment costs, dependent on the type of equipment and its use, or published references.

When comparing alternatives based on cost, it is important that the comparison include both capital costs and the difference in the present worth of the operation and maintenance costs. An alternative with a low initial capital cost may not be the most cost-efficient project if high monthly operation and maintenance costs occur with the alternative.

Salvage values are often included in present worth estimates, particularly where alternatives may be substantially different in nature (for instance one alternative involving substantial earthwork and one involving substantial mechanical work). The importance of the concept of salvage value is diminished when comparing mostly similar treatment elements.

The District currently invests time in general upkeep of the existing distribution system. We do not expect a noticeable change in O&M associated with any of the alternatives described in section 4 of this report. For this reason, we have excluded present worth analysis of the savings from the cost estimates below.

The following table provides a summary of the anticipated costs associated with each alternative.

Table 18 – Present Worth Analysis

ALTERNATIVES	PROJECT COST
ALTERNATIVE 1 - NO ACTION	$0
ALTERNATIVE 2 - ADDITIONAL FLUSH HYDRANTS	$222,821
ALTERNATIVE 3 - REPLACE & UPSIZING EXISTING MAINS	$1,473,612
ALTERNATIVE 4 - EXISTING WATER MAIN LOOPING	$1,669,990

5.2 Non-Monetary Factors

The alternatives presented in this study can and must be compared in a variety of non-monetary ways. To provide structure and a methodology to this comparison, the alternatives will be compared on six broad criteria as listed below. The comparison and ranking of some of these criteria will result in only very subtle differences that must be considered in the overall evaluations.

- Environmental Impacts – What affect does the alternative have in terms of adverse impact to the environment?
- Reliability – Will the alternative be reliable both now and in the long term with respect to future potential requirements?
- Impacts to Existing Facilities – Will the alternative impact existing Cooke City facilities or the property and facilities of the residents?
- Public Acceptance - Will the alternative meet the needs of the residents and will the residents be receptive to the alternative?
- Local Economic Affect – What affect does the alternative have in terms of keeping money in the local economy through local capital purchase, construction spending, and/or employment of local citizens?
- Public Health and Safety – Will the alternative protect and enhance the health and safety of the Town's residents?

Each alternative is compared below within the framework of these criteria.

5.2.1 Environmental Impacts

The largest environmental factor for this project is waste of water. The number of flushing hydrants is anticipated to have the largest impact on waste of water for each alternative. Each alternative will therefore be graded as such. The number of hydrants per alternative is as follows:

1. Alternative 2 – 7 Flushing Hydrants
2. Alternative 3 – 3 Flushing Hydrants
3. Alternative 1 – 1 Flushing Hydrant
4. Alternative 4 – 0 Flushing Hydrants

Therefore, the alternatives will be ranked inversely with Alternative 4 having the most positive environmental impact and alternative 2 having the most negative impact.

5.2.2 Reliability

When evaluating the reliability of each alternative for this project, we must consider two critical factors: the number of moving parts and the age of the system components. Moving parts encompass various elements such as valves, fire hydrants, flushing hydrants, and water services. The greater the number of moving parts introduced by an alternative, the higher the probability of system failure. Also, the age of the system components directly correlates with the likelihood of requiring repairs, with components installed before 2007 posing the greatest risk.

Alternative 1, being a no-action alternative, only considers the single existing flushing hydrant as a moving part, which currently operates with minimal additional O&M. However, it excludes aging mains replacement, rendering it one of the least reliable options. Conversely, Alternative 2 significantly increases the number of moving parts without replacing any outdated mains, making it the most unreliable option.

In contrast, Alternative 3 involves replacing all original aging mainlines, improving the system's reliability in terms of age. However, installation of new flushing hydrants presents both positive and negative impacts on system reliability, placing Alternative 3 as the second most reliable option. Alternative 4 addresses reliability concerns by replacing or abandoning all older mainlines, but introduces additional hardware underground. However, the proposed additional underground hardware including gate valves and PVC pipes is expected to have minimal impact on O&M. Consequently, Alternative 4 emerges as the most reliable alternative due to its comprehensive approach to system upgrades and minimal impact on overall operation and maintenance.

5.2.3 Impacts to Existing Facilities

With exception to Alternative 1, all proposed alternatives positively affect the existing facilities of the town. The two largest concerns to the Districts existing facilities are freezing problems and low-pressure complaints. All of the alternatives will address the freezing complaints. Only Alternatives 3 and 4 will address the low-pressure concerns.. Alternative 4 will require land acquisition from private residences.

5.2.4 Public Acceptance

The community will have concerns about any of the alternatives. Is it worth the money? Will the improvements address the existing issues with the system? Will this alternative help achieve the long-term goal of serving existing properties in the future? The only alternative that can answer yes to all of the questions above is Alternative 4.

5.2.5 *Local Economic Affect*

The largest consideration with respect to the economic effect of any alternative is the up-front cost in comparison the long-term revenue. The cost of each alternative increases from 1 to 4 respectively. Only Alternative 4 will help the District increase revenue in the long-term.

5.2.6 *Public Health and Safety*

Quality of water can be affected by dead-end mains. Though no issues have arisen from the existence of said mains, removal of dead-ends is considered positive in the eyes of MT DEQ.

Alternative 1 is the only alternative that will not enhance the quality of water in the system. Alternatives 2-4 relatively have the same level of positive influence on the health and safety of the community's water system.

5.3 Comparative Summary

Using the monetary and non-monetary information presented above, a comparative summary evaluation and ranking of alternatives is presented in the following table. For each of the criteria discussed above, each alternative was assigned a ranking score from 1 to 4, with 4 being the most favorable and 1 being the least favorable. The ranking factors were then multiplied by the relative weight of importance assigned to each evaluation criteria. The weighted rank scores were then summed, resulting in a weighted rank total score, the greatest score indicating the highest ranking. The weighting of each criterion in descending order is as follows:

- Cost Effectiveness and Public Health and Safety - 6
- Environmental Impact and Reliability – 5
- Impacts on Existing Facilities – 4
- Public Acceptance and Local Economic Affect – 3

Table 19 – Alternative Comparative Summary

COMPARISON PARAMETER	PARAMETER WEIGHT	ALTERNATIVES			
		1	2	3	4
Cost Effectivness					
Alternative Rank	6	3	1	2	4
Weighted Rank		15	5	10	20
Public Health and Safety					
Alternative Rank	6	1	2	3	4
Weighted Rank		6	12	18	24
Environmental Impacts					
Alternative Rank	5	3	1	2	4
Weighted Rank		15	5	10	20
Reliability					
Alternative Rank	5	2	1	3	4
Weighted Rank		10	5	15	20
Impacts to Existing Facilities					
Alternative Rank	4	1	2	4	3
Weighted Rank		4	8	16	12
Public Acceptance					
Alternative Rank	3	4	2	1	3
Weighted Rank		12	6	3	9
Local Economic Affect					
Alternative Rank	3	4	3	1	2
Weighted Rank		12	9	3	6
Weighted Rank Total		**74**	**50**	**75**	**111**

6 PROPOSED PROJECT

Alternative 4 "Existing Water Main Looping" is the recommended alternative to address the towns water system problems and future goals. The proposed project will include tying into existing dead-end water main and looping back into the existing system. 6" PVC pipe will be utilized for all of the proposed water mains with cast iron fittings as needed. New gate valves will be installed at intersections to allow for isolation of segments in the system. Directional drilling and/or jack and bore will be required to loop the Skunk Hollow water main. Alternative 4 also includes replacement of sections of main in Maring Street and Skunk Hollow.

In addition to Alternative 4, improvements will be made to the well house, well heads, and the storage tank. The community storage tank mixer is failing and in need of repair/replacement and has been added to the cost of this alternative. The well house has a failing roof requiring immediate attention as well. Figure 8 shows the extent of the existing damage to the roof structure.

Figure 8 – Failing Well House Roof

6.1 Preliminary Project Design

The proposed project will take place throughout several locations in Cooke City. New water main will be installed in Montana Street, Huston Street, Black Street, Broadway Street, Martin Street, and on the east side of town crossing Highway 212. Approximately 4,300 LF of new water main is proposed as part of this project. All new water main will be 6" PVC pipe. The proposed project will also replace aging water main installed prior to 2007. About 1,000 LF of the new pipe will replace the existing water main in Martin Street and Skunk Hollow.

Jack and bore is proposed for the Highway 212 crossing on the far east side of Cooke City. The proposed jack and bore will utilize a 12" steel carrier pipe under the highway for approximately 50 feet. Directional drilling under Miller Creek will utilize 6" PVC with locking connections.

The proposed Miller Creek crossing will require a joint application for permitting the crossing. The work will require a 310 permit, SPA 124 permit, Section 404 permit, and 318 authorization.

6.2 Project Schedule

Before the project can be implemented, the funding must be in place. The proposed funding strategy includes a MCEP grant and RRGL grant. The RRGL grant application is due no later than May 15th, the MCEP grant application is due by mid June , 2024. The community will not likely know until spring of 2025 whether their project has been funded. Upon securing all funding, the project start-up for the grant program is expected to be about a two-month process. The engineering could begin once a contract is completed between the grant agencies and the District, likely during the second or third quarter of 2025. DEQ review would likely take place in the winter of 2025 with approval anticipated by spring of 2026. Once DEQ approval is granted, the project would be advertised for bid early in 2026. It is anticipated for construction to begin in the spring of 2026 with an expected completion date in the spring of 2026. Due to the nature of the work and the location of the community, it is very likely the construction extends into the spring and summer of 2027. The following table provides a summary of the expected schedule.

Table 20 – Project Schedule

TASK	QUARTERS, 2024				QUARTERS, 2025				QUARTERS, 2026				2027	
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
	JFM	AMJ	JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
Project Startup														
Advertise for & Select Engineer	X													
Finalize PER	X													
Submit Funding Applications		X												
Legislative Action of Applications					X									
Grant Award							X							
Project Design														
Commence Final Design							X							
Complete Project Design								X						
Submit Plans to DEQ								X						
Prepare Bid Documents									X					
Advertisement for Const. Bid														
Public Bid & Advertisements									X					
Open Bids & Examine Proposals									X					

Request Contr. Documents										x				
Select Contractor & Award Bid										x				
Conduct Pre-Const. Conference										x				
Notice to Proceed to Contractor										x				
Project Construction														
Begin Construction										x				
Monitor Contractor										x	x	x	x	x
Labor Compliance Reviews										x		x		x
Hold Const. Progress Meetings										x	x	x	x	x
Final Inspection														x
Project Close Out														
Submit Final Drawdown														x
Project Completion Report														x
Submit Record DWGs to DEQ														x

6.3 Permit Requirements

The project design will be submitted and approved by the Department of Environmental Quality (DEQ). The DEQ will require record drawings to be submitted once the project is completed.

The following design and permitting criteria would apply:

1. MT DEQ Circular 1 – Standards for Water Works
2. USACE – Joint Application
3. Potential Floodplain Permit
4. National Park Service Permit (Highway 212 Crossing)

The following projected water demands will be used as the basis for design:

- Average Day Demand 12 gpm (16,916 gpd)
- Peak Day Demand 20 gpm (28,635 gpd)

Prior to construction, the contractor will be required to obtain a Storm Water Pollution Prevention Plan (SWPPP) permit to meet storm water requirements.

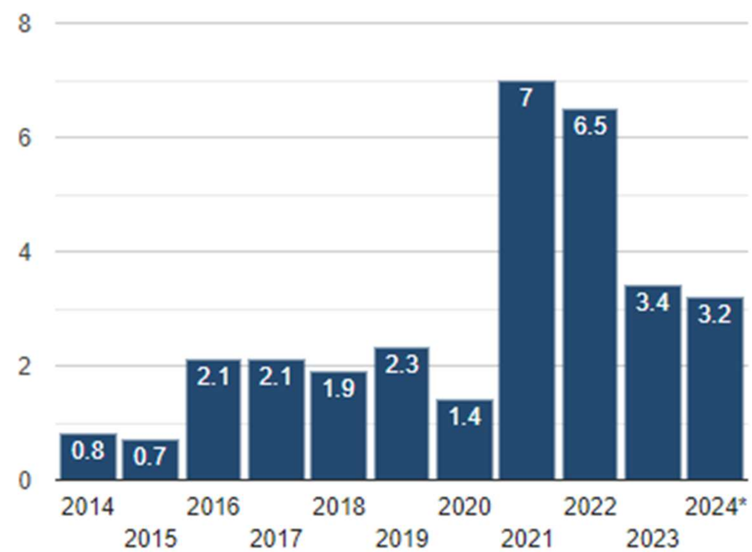
6.4 Sustainability Considerations

One of the main purposes of this project is to eliminate the waste of water by the District. As discussed in sections 2 and 3 of this document, a flush hydrant wastes approximately 91,250 gallons of water a year. The proposed project would eliminate the flush hydrant and the need to flush dead-end mains entirely.

6.5 Total Project Cost Estimate

Costs for each alternative were previously developed for comparison purposes. Independent of the alternative selected, certain expenses are required and have been added to the following cost estimate (i.e. grant administration, legal costs, personnel costs, office costs, etc). These costs have been incorporated into the following table. Based on the above-mentioned schedule the project is anticipated to bid in 2026 with construction completed in 2027; therefore, we have included additional inflation costs through 2027. The following figure indicates the US annual rate of inflation over the last several years.

Figure 9 – US Annual Inflation (2014-2024)



Credit Photo Courtesy Of https://www.usinflationcalculator.com/inflation/current-inflation-rates/

We have used an inflation rate of 4.4% (2022-2024 avg US annual inflation rate) per year which is the average rate of inflation over the last 3 years. The following table provides a total project cost including inflation based on construction in 2027.

Table 21 – Alternative 4 Cost Estimate

Alternative 4 Construction Cost Estimate							
Project		Item	Unit	Quantity	Unit Cost	Total
Alternative 4 Costs	General Requirements	General Requirements (assumed 25% mobilization, bond, insurance etc.)	LS	1	$223,776	$223,776
		Easement Adquisition	LS	1	$20,000	$20,000
		Traffic Control	LS	1	$45,000	$45,000
		General Requirements Total Costs				**$288,776**
	Additional Work	Existing Water Main Demo	LF	927	$26	$23,734
		Clear & Grubbing (Timber)	AC	0.4	$17,068	$6,827
		Gravel Road Restoration	SY	2789	$17	$47,602
		Asphalt Road Restoration	SY	167	$154	$25,603
		Yard Restoration	SY	1113	$14	$15,202
		Additional Work Total Costs				**$118,968**
	New Water Main	6" C900 PVC Pipe	LF	4367	$106.68	$465,861
		6" MJ Tee	EA	4	$108	$432
		6" MJ 90° Elbow	EA	5	$1,365	$6,827
		6" MJ Cross	EA	1	$2,560	$2,560
		6" MJ Gate Valve	EA	16	$4,552	$72,825
		8"x6" MJ Cross	EA	1	$2,845	$2,845
		New Water Main				**$551,350**
	Water Main Additional Work	12" Jack & Bore	LF	50	$1,706.84	$85,342
		Directional Drill (Pipe Included)	LF	50	$568.95	$28,447
		Service Re-Connect	EA	3	$1,138	$3,414
		Connection to Existing Main	EA	11	$5,689	$62,584
		Water Main Additional Work				**$179,787**
	Repair & Maintenance	Well House Roof Repairs	LS	1	$7,500	$7,500
		Storage Tank Mixer & Fence	LS	1	$20,000.00	$20,000
		Well Head Conduit Fix	LS	1	$1,000	$1,000
		Repair & Maintenance				**$28,500**
Alternative 4 Construction Cost						$1,167,382
20% Contingency						$233,476
Alternative 4 Total Construction Costs						**$1,400,858**
Engineering (Assumed 20% of Total Construction)						$280,172
Geotechncial Investigation						$30,000
Total Cost (2025)						**$1,711,030**

6.6 Annual Operating Budget

To formulate a financing plan for the water facility improvements, the estimated cost of the project and the sources of potential revenue available must be known. Capital is required to design and build the facilities. The necessary capital can come from cash reserves, federal and/or state grants and loans, or be borrowed from other sources.

Generally, loans or borrowed capital are amortized in the form of bonds. The bonds are paid off a little each year at some stated interest rate and term, usually 20 to 40 years.

6.6.1 Income

The average water system revenue over the past 3 fiscal years was calculated previously, and is approximately $79,929.88 annually. The Water District currently has a rate increase scheduled on July 1, 2024. Based on calculations completed in section 2.7 of this report, the projected annual revenue will increase to $83,840.79. Also, once the water system has been updated and can provide adequate distribution for an increased number of users, the average annual revenue will increase by the water rate per new user.

The Cooke City area district has a 4% resort tax on all tourism type charges. The resort tax went into effect on January 1, 2006, and has a duration of 20-years. The resort tax will be considered again by voters prior to its expiration in 2025. For the last two years the District has received $20,000 per year from the resort tax. The Water District also claims a portion of the area's property taxes. Over the last three years, the District has received on average $31,600 in property tax revenue every year.

6.6.2 Annual O&M

The Water Districts average annual water system O&M costs were approximately $122,233.88. The District's financial information is included in Appendix I. This includes operations, administration, miscellaneous costs, accounting/collection, and debt service. Due to the nature of tourism in Cooke City, the District is reliant on property and resort taxes to help fund infrastructure projects. A breakdown of the overall income and expenses for the last three fiscal years is summarized in Table 22 below.

Table 22 – Net Income Summary

YEAR	TOTAL INCOME	EXPENSES	NET INCOME
2021	$157,667.80	$132,827.92	$24,839.88
2022	$142,860.89	$115,040.71	$27,820.18
2023	$139,067.66	$118,833.02	$20,234.64
Average	$146,532.12	$122,233.88	$24,298.23

6.6.3 Debt Repayment

The preliminary sources of funding available to local entities such as the community of Cooke City wishing to undertake large capital projects for water facilities has typically been through federal and state financial assistance. These funds have traditionally been used to underwrite major portions of projects through the issuance of grants or loans that may be repaid at terms favorable to most communities. One of these programs requires a local matching share that is most often obtained by issuing local government bonds. Funding programs often require that funds be appropriated during sessions of Congress or the state legislature, and in most cases the appropriated funds are less than the amount requested. Some of the available funding sources for this type of project include MCEP Grant, RRGL Grant, and SRF Loan. A summary including eligibility requirements for each of these programs can be found in Appendix I.

Montana Coal Endowment Program (MCEP)

MCEP is a state funded grant program administered by the Montana Department of Commerce. MCEP provides financial assistance to local governments for infrastructure improvements. MCEP provides grant funds of up to $500,000 for any project, with a maximum of 50% of the total project cost (up to $750,000 if rates exceed 150% of the target rate and up to $625,000 if rates exceed 125% of the target rate). The other 50% or less can come from numerous other sources including other grants, loans, or cash. To be eligible for MCEP funds the established user rates must meet or exceed the target rate. Cooke city will be eligible to apply for a $750,000 MCEP matching grant or half of the project costs, whichever is greater after the proposed rate increase.

The target water and sewer rates and the current water and sewer rates per EDU were established above in Chapter 2. The projected water and sewer rates per EDU are $67.83 and $41.49 per EDU per month, respectively. The water and sewer target rates established by the MT Department of Commerce for the Cooke City Water District are $43.02 and $27.66 per EDU per month, respectively. Cooke City's current combined water and sewer rate is $105.77 per EDU per month which is 150% of target rate; therefore, Cooke City currently qualifies for the maximum MCEP Grant of $750,000. MCEP Grant eligibility is based on post project rates which have been established and summarized in the following section.

Renewable Resource Grant and Loan Program (RRGL)

The Renewable Resource Grant and Loan Program (RRGL) is a state program that is funded through interest that accrues on the Resource Indemnity Trust Fund and the sale of Coal Severance Tax Bonds and is administered by the Montana Department of Natural Resources and Conservation (DNRC). Grants of up to $125,000 are awarded for projects that conserve, manage, develop, or protect Montana's renewable resources. The Cooke City Water District will pursue a $125,000 matching RRGL grant.

State Revolving Fund (SRF)

The State Revolving Fund (SRF) provides low interest loans for both water and wastewater projects through the Drinking Water State Revolving Fund (DWSRF) and the Water Pollution Control State Revolving Fund (WPCSRF), respectively. The SRF program is administered by the Montana Department of Environmental Quality. Loans are offered at an interest rate of 2.50% for 20 years, though shorter loans can be obtained. The SRF program also offers principle forgiveness for their loans which is administered as funds are available. The Water District will purse a SRF loan/loan forgiveness to make up the difference between the total project costs and the RRGL & MCEP grant funding.

Grants and loans may not be available to cover all the projected costs of the facility. In this case, the Town's local share can be provided by loans secured by general obligation or revenue bonds, or cash provided by current rates. General obligation bonds for water facility construction are generally retired by property taxes, and are therefore recommended only when the improvements will result in increased property value or provide benefits in direct proportion to the value of the property. The mechanics of financing improvements under general obligation bonds are relatively simple. A cost estimate prepared by the engineer is used to determine the amount of the bond issue; an election is held, and, if the issue is authorized by the voters, the bonds are offered for sale. The money for construction is obtained prior to the time the project is undertaken. This method of financing considers the improvements to be of general benefit to all property. This type of bond generally carries a lower interest rate than revenue bonds, thereby lowering user costs.

Revenue bonds are repaid solely from revenues derived from the facility. There is generally no legal limitation on the amount of bonds that may be issued, but there is a practical limitation in that excessive offerings are not likely to attract bids from responsible buyers. Furthermore, to entice a bond buyer's interest in the market today, an attractive bond coverage factor of 125 percent is required. Interest rates are generally higher for revenue bonds. Higher interest rates along with required coverage factors will increase user costs.

In some instances, public facilities are financed partly by general obligation bonds and the balance by revenue bonds. By properly apportioning the two, an equitable financing setup can often be created. In this manner, conditions are more favorable for the governmental body to finance the system while relieving, to some extent, the financial restrictions on the system, had it been entirely backed by revenue bonds.

The Water District currently has four outstanding loans from prior projects totaling in $1,212,217 in the end of 2023, and is in good standing with payments.

The impact on the water rates from the proposed project can only be estimated because the exact effect on existing water rates is dependent on the success of future grant and loan applications. The following table summarizes the funding strategy and total project costs.

Table 23 - Total Project Cost Estimate

Item	Funding Source				Total
	MCEP	RRGL	SRF LOAN	LOCAL	
Administration					
Personnel Costs				$1,000	$1,000
Office Costs				$1,000	$1,000
Grant and Loan Admin				$30,000	$30,000
Legal Costs					$0
Audit Fees					$0
Travel & Training					$0
Loan Origination Fees					$0
Interim Interest					$0
Loan Reserves					$0
Bond Counsel					$0
Total Administrative	$0	$0	$0	$32,000	$32,000
Construction Related Activities					
Easement Acquisition			$20,000		$20,000
Geotechnical Investigation			$30,000		$30,000
Engineering Design			$210,129		$210,129
Construction Engineering Services			$70,043		$70,043
Construction	$750,000	$125,000	$272,382		$1,147,382
Contingency			$233,476		$233,476
Total Construction Activity	$750,000	$125,000	$836,030	$0	$1,711,030
Total Project Budget	**$750,000**	**$125,000**	**$836,030**	**$32,000**	**$1,743,030**

To estimate the increase in user fees, the average water usage by each user per month must be considered. Then, the total cost of water is based upon the most up to date tier billing at the time of the project. This billing system was summarized in section 2.7 of this report.

Determining the extent of a rate increase hinges on the desired net income that the District aims to retain. Given that the District's income is intricately tied to water usage, which can fluctuate significantly, it underscores the need for a careful assessment. Balancing the financial needs of the District with the dynamic nature of water consumption requires a nuanced approach to setting rates that ensures sustainability while remaining responsive to changing demand patterns. Rate increases and the expected net income of the water district have been calculated and shown in Table 24 below.

Table 24 - Total Project Cost Estimate

% Rate Increase	Increase In Net Income	SRF Loan Payment	Projected Net Income
58%	$52,554	$53,629	$23,223
40%	$37,462	$53,629	$8,132
30%	$29,078	$53,629	($252)

As shown above, an approximate 58% increase in user rates would be needed to pay for the proposed SRF loan amount. The total increase in user fees is estimated to be $53,629 per year or $4,469.08 per month. The total number of EDU's is 103 as presented above. Therefore, the increase in fees would be $43.39/EDU/month.
The project base rate after July 1, 2024 for Cooke City is established at a base rate of $39.39 with a tiered billing system for water use over 5,000 gallons. The July 2024 rates are outlined in Table 12 above. A 58% increase to the base rate and additional use rates would result in a new base rate of $62.24 for the first 5,000 gallons and a tiered billing system shown in Table 25 below.

Table 25 – Proposed Rate Increase

USAGE (GALLONS)	ADDITIONAL COST	COST UNIT	% Increase	Average Increase
5001-10,000	$1.26	PER 100 GALLONS	58%	58%
10,001-25,000	$1.58	PER 100 GALLONS	58%	
25,001-40,000	$1.82	PER 100 GALLONS	58%	
40,001-50,000	$2.13	PER 100 GALLONS	58%	
Over 50,000	$2.37	PER 100 GALLONS	58%	

7 CONCLUSIONS AND RECOMMENDATIONS

Cooke City's utilities are currently managed by two separate entities with no administrative overlap; the Cooke Pass, Cooke City, Silver Gate Sewer District and the Cooke City Water District. As of 2023, Cooke City was facing significant challenges regarding its water system infrastructure; primarily related to substantial leaking, freezing, and water waste. The Cooke City Water District initiated preparation of a preliminary engineering report (PER) by Triple Tree Engineering as part of its infrastructure improvement efforts. This PER documents the study, conclusions, and recommendations for the community's water system.

It was found that immediate attention was needed for the well house, well heads, and storage tank mixer. Also, the distribution system had multiple dead-end mains causing problems for the District. Through a comprehensive analysis of various alternatives, it was determined that the most effective solution entailed installation of additional water mains to loop the system and eliminate existing dead-ends.

It is recommended that the Water District utilize the preliminary engineering report (PER) to proceed with grant funding applications as soon as possible.

Appendix A – Correspondence with Affected Agencies

Appendix B – Census Data

Appendix C – Public Hearing Information

Appendix D – DEQ Sanitary Survey Inspection Report

Appendix E – System Exhibits

Appendix F – Well Logs and Water Rights

Appendix G – Tank Inspection

Appendix H – ISO Hydrant Test Results

Appendix I – Financial & Funding Info

Appendix J – DEQ Water Quality Report