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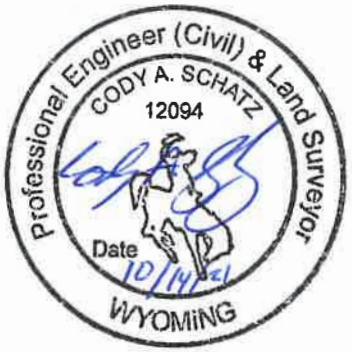
CITY OF CODY MASTER PLAN
LEVEL 1 STUDY

EXECUTIVE SUMMARY

FUNDED BY: Wyoming Water Development Commission

COMMISSIONERS:
Robert Choma
Leonard A. Craig
Liisa Anselmi-Dalton
Clinton W. Glick
Ron Kailey, Jr.
Mark Kot
Sheridan Little
Larry Suchor
Bill Yankee



DIRECTOR: Brandon L. Gebhart, PE

SPONSOR: City of Cody, Wyoming

CONSULTANT:
Engineering Associates
Consulting Engineers and Surveyors
POB 1900
902 13th Street
Cody, Wyoming 82414
(307) 587-4911
www.EAEngineers.com

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SCOPE OF STUDY

The Wyoming Water Development Commission selected Engineering Associates to complete a Master Plan, Level 1 Study of the City of Cody's treated water and raw water systems. Hydraulic models and mapping of each system was updated with data available through 2019. Engineering Associates established future growth projections and associated water needs for both systems. A list of system upgrades was prioritized for both the treated water and raw water systems, including a construction schedule and construction costs related to each proposed improvement. Finally, rate structures for both systems have been developed to support these upgrade recommendations.

The Report is presented in two volumes to better communicate the analysis of the two separate water systems. Volume 1 contains the treated water portion of this study, while Volume 2 contains the study of the raw water system. Each volume will present a standalone Water Master Plan for that water system which will provide the City of Cody the necessary data to assist with prioritizing improvements, forecasting future needs, recommendations for operations and maintenance, and recommendations for modifications to water use rate structures. Both plans specifically include priority upgrades for replacing small diameter pipes with increased pipe sizes, extending and looping distribution lines to improve system pressures and fire flows, and updating storage needs.

BACKGROUND INFORMATION

The City of Cody has two distinct water systems that it maintains. One is its treated water system for drinking water and the other is its raw water system for landscape irrigation. The Cody treated water delivery system consists of over 90 miles of distribution lines, 10 pressure reducing valve stations (PRV), and 3 storage tanks totaling 2.792 million gallons of storage. A current project on Beacon Hill to add an additional 1 million gallons of storage is under construction, which will increase the total City storage capacity to 3.792 million gallons by Fall 2021.

The City of Cody purchases treated water from the Shoshone Municipal Pipeline (SMP). Cody is the largest treated water user on SMP's system. Shoshone Municipal Pipeline is operated by the Shoshone Municipal Water Joint Powers Board, which consists of representatives of the entities served including Cody, Powell, Byron, Lovell, Deaver, Frannie, and the Northwest Rural Water District. The purchase agreement between the City of Cody and SMP allows the city a maximum draw of 7,889 gpm.

In addition to the treated water system, the City relies heavily on the existing raw water system to minimize the use of treated water for lawn and garden irrigation. Previous studies have shown that the City's raw water consumption during the summer months can surpass the treated water consumption for the whole year – despite the fact that the raw water system services about one-third of the City (962 acres). The City currently pumps raw water from two sources, Beck Lake and the New Cody Reservoir along the Cody Canal. The Cody raw water system contains about 4 miles of distribution lines,

one in-use 840,000-gallon storage tank, and two intake pumps that move water from Beck Lake and the New Cody Reservoir to the storage tank.

Previous WWDC studies completed for the City of Cody have found that the raw water system is essential to the City of Cody's infrastructure. Without the use of the raw water system, much of the City's treated water system would need to be upsized to accommodate the summer irrigation usage demands. Previous studies have also found that the cost of expanding the raw water system is comparable in cost to expanding the treated water system, so while it is highly beneficial to the City to continue operating the raw water system, expansion of the system is currently limited to those areas of the City which can meet the pressure requirements via the current pumping and storage systems. The desire is to not require the installation of additional costly system components such as more pumps or storage tanks.

There are large sections of the City that do not have access to raw water and are served irrigation water by the Cody Canal System directly. The use of irrigation water from Cody Canal likewise helps to minimize the strain of lawn watering on the City's treated water system in the summer months.

POPULATION PROJECTIONS

The population within the City of Cody grew at a modest 1.13% between 2010 and 2019. While at the time of this Report the City of Cody is experiencing a massive population surge due to circumstances relating to the Coronavirus pandemic of 2020. While the effects of the population boom is expected to extend into 2021, the City is not expecting or planning on it continuing much farther into the next planning cycle. A 1.3% expected growth was used to forecast the projected 20-year population growth.

Population Forecast

Year	*Population*	*Description*
2010	9,520	U.S. Census
2019	9,872	Base Year
2042	13,287	Future Year - 20 Years

TREATED WATER DEMANDS

As of 2019, the City of Cody's treated water system serviced approximately 5,489 residential addresses, 838 commercial, and 53 city-owned services. For these users, approximately 450 to 480 million gallons of treated water is sold every year. From SMP, the City purchases approximately 550 to 580 million gallons. The average annual water sold by the City to customers was 465.8 MG and water purchased from SMP was 568.1 MG for period between 2018 through 2020. Average annual treated water loss was 18 percent.

The City currently has 4,967 water taps that have equivalent capacity to 6,302 Equivalent Dwelling (or Residential) Units (EDUs); 8,342 EDUs are project within the City by 2042. The City's maximum allocation from SMP is adequate to provide treated water to 25,586 EDUs under current per EDU usage. That is four times the current number of EDUs in the City and 3 times the 2042 projections.

Treated Water Demand

	Water Demand for Year 2019	Water Demand for Year 2042
Average Daily Demand (ADD) (Annual TW Metered/365 days)	1.331 MGD (924 GPM)	1.790 MGD (1,244 GPM)
Maximum Daily Demand (MDD) (ADD x 2.1)	2.794 MGD (1940 GPM)	3.761 MGD (2,612 GPM)
Peak Hour Demand (PHD) (ADD x 3.0)	3.992 MGD (2772 GPM)	5.372 MGD (3,731 GPM)

FIRE FLOW REQUIREMENTS

Municipalities are required to provide adequate fire flow to their community per the State Fire Marshall and 2018 International Fire Code (IFC). The requirements state that a certain flow and time duration is required with a minimum delivery pressure of 20 psi, while not allowing pressures at other locations to drop below 20 psi. This is also required by Wyoming DEQ.

Based on these criteria, we analyzed fire flow capacities in selected business and residential areas. The fire flow demand for residential areas is 1,000 gpm for 2 hours, and a minimum of 1,500 gpm for 2 hours is required for businesses. Based on the development in Cody, there are a few commercial buildings that are large enough and of the type of construction that requires higher fire flows (4,000 gpm for 4 hours). Those structures generally have fire suppression sprinklers (Buffalo Bill Center of the West, Park County Library, Yeezy Shoe Factory, Walmart, etc.), allowing a 75 percent reduction in fire flows needed. Moving forward, the City and/or Fire Marshal will likely require in-building fire suppression systems that would result in 1,500 gpm for four hours being adequate for any structure likely to be built in Cody.

Minimal replacement of 4-inch and 6-inch pipes has been completed since the 2009 WWDC study. Specific improvements were identified to help overcome deficiencies noted at that time in fire flows. Continued deterioration of the system has resulted in the need to look at pipelines more holistically than recommended at that time. This has been done for two primary reasons.

- The distribution system has started experiencing more leaks in the piping, which may hamper water supply to areas in need. Basically, little is gained if a deteriorated pipe breaks between transmission lines and a "new" line replaced to provide fire flows.
- The construction cost for replacing random pipes throughout the water system will be high compared to a systematic approach of approaching pipe in areas with known deterioration.
- Recent changes to the fire code have increased the use of fire suppression systems in structures that require highest fire flows.

As replacement of existing antiquated pipe occurs within the City, all replacement pipes for 4-inch, 6-inch, and 8-inch should be a minimum of 8-inch diameter. This will facilitate meeting future fire flows of at least 1,500 gpm throughout replacement areas. This will take care of most of the deficient fire flow areas within the City. The fire flow maps show existing and future fire flows available.

TREATED WATER STORAGE REQUIREMENTS:

Storage Recommendations

City of Cody - Water Storage Recommendations

Year	*Operational Storage (MG)*	*Fire Storage (MG)*	*Reserve Storage (MG)*	*Bottom Storage (MG)*	*Req'd Storage (MG)*	*Available Storage (MG)*
2019	0.978	0.960	0.698	0.110	2.747	2.792
2042	1.316	0.960	0.940	0.153	3.369	3.792

The City's storage capacity will exceed the storage requirements for the year 2042 when the new Million-gallon Beacon Hill Storage Tank comes online this year.

RAW WATER DEMANDS

The average day demand (ADD) and maximum day demand (MDD) were projected based on records from the City of Cody for 2015 to 2019 for the Raw Water System. Data available had some questionable flow rates for periods during several years reported. The average daily pumping rate on watering days averaged out to 4,681,500 gallons. ADD was calculated by dividing the pumping rate by the existing service area of 962 acres for an estimate of 4870 gpd per acre. That figure was rounded up to 5,000 gpd per acre based on the imprecision of the data.

Raw Water Demand

Current Raw Water Requirements (962 acres)	Average Daily Demand (ADD)	5,000 GPD/ACRE 4.8 MGD
	Maximum Daily Demand (MDD)	10,000 GPD/ACRE 9.62 MGD

RAW WATER SOURCES AND WATER RIGHTS

The City's raw water is obtained from the Cody Canal Irrigation District (CCID). Water from the Southfork of the Shoshone River southwest of the City supplies water to Cody Canal. Water then flows northeast in the Canal past the south side of Markham Reservoir and New Cody Reservoir and then flows northeast past Beck Lake to the east of Cody to supply water to farmers.

A headgate in Cody Canal near the east-west center of Markham Reservoir diverts water from the Canal into adjacent Markham Reservoir. That water subsequently flows into New Cody Reservoir that is ultimately pumped into the raw water system through the New Cody Pump Station. This path helps to settle some of the sediment from the canal before the water is pumped into the City's 840,000-gallon raw water storage tank.

Beck Lake serves as a secondary source to the system. Water is pumped directly from Beck Lake into the Raw Water System. The water in Beck Lake is diverted by a headgate in a lateral that flows north past Beck Lake and into the City of Cody. This pump station helps to supply water during high demand periods.

The City of Cody has numerous primary and secondary raw water rights. New rights are obtained with every new subdivision as the City's Subdivision Ordinance requires new subdivisions to transfer existing surface water rights to the City if no on-site raw water system is planned. Per the ordinance, the acquired rights must also be changed from irrigation to municipal. This has allowed for the City's raw water allocation to grow and has provided the City with the opportunity to expand the raw water system as the need arises and as funding becomes available.

Cody has water rights of 13.746 cfs adjudicated to the raw water system. The current average usage is approximately 4.8 MGD with annual peak usage as high as 12.0 MGD

RAW WATER SYSTEM OPERATIONS

City crews perform general maintenance on the raw water system yearly as they turn the system on in the spring, as they winterize the system in the fall, and as leaks and issues are discovered during the summer.

The City requires raw water system users to irrigate on an alternating day watering schedule. Properties with even numbered addresses water on Wednesday, Friday, and Sunday, while odd numbered addresses water on Tuesday, Thursday, and Saturday. Users are asked not to water on Mondays to allow City crews to perform necessary maintenance. This procedure was put in-place because it was found that the demand on the system is so high during peak use those users can quickly exceed the capacity of the existing pumps.

On this current watering schedule, users are allowed unlimited watering for 24 hours per day, three days a week. Raw water usage is currently unmetered, so users pay a flat fee for their access to the water. The City has found that this leads to some users intentionally overwatering, and commonly ignoring basic water conservation techniques as there is no penalty to overwatering or for excess water lost to evaporation or runoff.

In general, a standard lawn requires about 1 inch of water per week during warm to moderately high temperature periods and 2 inches of water for the hottest and driest periods of the summer in Cody. That amount of water equals between 27,000 gallons and 54,500 gallons per week per irrigated acre. The Cody raw water service area is approximately 962 acres, with 700 of those acres utilizing irrigation water. Based on those numbers, the average summer raw water use should be between 2.7 and 5.45 MGD, with an average of 4 MGD, if rainfall events are not considered.

The benefit the raw water system provides the City of Cody's infrastructure cannot be overstated. Every gallon of raw water used for irrigation is one less gallon that would otherwise be provided by the treated water system. The cheaper cost of providing raw water, the less demand on the treated water system, and the increase in the useful life for all components of the treated water system all contribute to cost savings to the residents of the City of Cody.

SYSTEM IMPROVEMENTS CONSIDERATIONS

TREATED WATER SYSTEM IMPROVEMENTS

The City has actively taken steps to address the issues outlined in previous WWDC Master Plan studies, which most recently included increasing water storage capacity and replacing outdated and undersized distribution and transmission lines. As different system components age and as population and demands increase, the water system will need improvements to keep pace with the changing dynamics of the City.

Storage System

The Beck Lake Tank and the North Cody tank both are due for recoating of their ferrous iron components, and the City should make it a priority to budget for these general tank maintenance projects. In addition to recoating the ferrous components of the tanks, the North Cody Tank's seals should continue to be inspected and should be re-sealed regularly to prevent failure.

Transmission and Distribution System

The City plans to focus primarily on replacing and upgrading those components of the treated water system which are aged or undersized. The following projects are recommended to accomplish this primary goal.

Replace pressure-reducing valves (PRV).

The 9 existing PRVs in the City of Cody's treated water system are about 20 years or more old. In addition to age, the PRVs are contained in underground vaults which have no ventilation, are not up to current safety standards, and are not easily accessible. It is recommended all 9 PRVs be scheduled for replacement over the next 5 or so years.

Renovate the treated water pump stations.

The pump stations in the treated water system will likely be due for upgrades in the next planning cycle. The Valley View pump station was installed in 1998, while the North Cody pump station was installed in 2010. The life expectancy for pumps such as those installed is approximately 20 years, so it is recommended that the City budget for their replacement in the near future.

Replace undersized treated waterlines and all ferrous iron and asbestos cement pipes.

As previously mentioned in this Report, it is generally recommended that all 4" and 6" water mains be upsized to 8" to improve fire flows. It is also recommended that the City replace all ductile iron, cast iron, and asbestos pipe with PVC to reduce water loss and to reduce the cost of annual maintenance and repair by city personnel.

Low pressure on treated water transmission line near the golf course

While it is not likely to be a significant issue in the current planning cycle, it was noted in the analysis of the hydraulic model that there will be low pressure in the transmission line near the Beck Lake connection to SMP where the line crosses the ridge east of the third tee on the golf course. No indication was found that this will impact supply capabilities over the next 20 years.

Potential treated water annexation areas

Several potential annexation areas have been identified due to proximity and anticipated future City development. Discussions with the City indicate that they anticipate those areas will grow organically and that they will not be actively pursuing

the installation of treated water infrastructure to serve those areas. The City anticipates that those parties developing in those areas will identify water system needs and pay for such improvements. As such, the water system was modeled to verify that water is available at potential connection points. Potential annexation areas are described as follows:

- The North-West Cody Residential Area
- North Cody Annexation Area
- Sage Creek Annexation Area
- South Cody Industrial Area
- The Panorama View Expansion Area
- West End Annexation Area
- The Cooper Lane Area

RAW WATER SYSTEM IMPROVEMENTS

One question that has been considered is whether continued operation of the raw water system is economical given that irrigation water can be delivered to those same properties with the treated water system. Given that the raw water system is already in place and that end users have designed their sprinkler systems to use raw water, it seems that eliminating the raw water system would create a significant cost to the City and users to modify those systems to use treated water. The raw water system provides over 600 million gallons of irrigation per year during the summer. Purchase of that water from SMP would cost about $800,000 per year. Current customer charges for raw water total just over $300,000 annually. At current raw water usage levels, raw water users would pay an additional $500,000 per year if that system were abandoned and their lawn watered with treated water.

PRIORITIZATION OF IMPROVEMENTS

TREATED WATER SYSTEM PRIORITIES

Due to the ever-increasing age of the City's treated water infrastructure, changes in water system construction that have increased corrosion of buried metal pipe, and limited waterline replacement efforts over the last 30 years, many pipes need replaced. Efforts have been focused on creating a Capital Improvement Plan (CIP) to update pipes, hydrants, PRVs, and pump stations to reduce the "management-by-crisis" approach employed by many utilities with aging systems, and to reduce day-to-day emergency repairs. The goal of this CIP is to slowly shift treated water expenditures from paying for repairs to paying for replacements.

Replacing failing 8-inch and smaller ductile iron, cast iron, and asbestos cement pipe with new 8-inch or larger PVC pipe will significantly improve fire flow capacity and increase system reliability.

RAW WATER SYSTEM PRIORITIES

Pump Station Filter System Installation / Raw Water Pump Station Upgrades

As previously mentioned, it is recommended that the filter system installation and pump station upgrades occur concurrently as that is the most efficient and cost-effective option. To eliminate the concern of delivering debris to the raw water users, both pump stations would need to be equipped with the recommended filtration systems at the same time. However, as the pumps at the Cody Canal intake bear the highest usage, updating that pump station should be prioritized. Work on the Cody Canal pump station should be completed within the next five years and the Beck Lake pump station before any system expansion undertaken.

Raw Water Storage Tank Maintenance

Assuming that inspection of the 23-year-old water tank will indicate a need for rehabilitation; including cleaning, sand-blasting, and recoating the interior of the 840,000 gal storage tank. It is recommended that a project addressing the necessary rehabilitation of the storage tank be completed within the next five years.

Raw Water System Expansion

Priority 1 – The Softball Field Expansion

The City would like to expand the raw water system to irrigate the softball fields to the east of town and to provide that service to the residents in that area. The recommended upsizing of the Central Avenue pipeline will directly accommodate this expansion which would be located east and north of the Central Avenue raw water line. This project is recommended to be completed in the next two to five years with the completion of the Central Avenue reconstruction.

Priority 2 – Central Avenue Reconstruction

The City of Cody is currently planning on reconstructing Central Avenue within the next one to three years. During this reconstruction, the City plans to replace 5,100 feet of existing 8” raw water line with 12” PVC or HDPE. This larger transmission line will facilitate further growth of the system to the east.

Priority 3 – Mountain View/29th Street Transmission Line

The Softball Field Expansion provides the opportunity to create a new transmission line from Beck Lake to the Softball Field area to the east. Upsizing the transmission line between these areas to 12” pipe would further increase the capacity for raw water system expansion to the easterly unserved portions of town. This project is recommended to be completed within three to ten years with the completion of the Softball Field Expansion and as the City’s budgeting allows.

Panorama View Expansion

Developers are expecting to expand the Panorama View Subdivision. It is expected that they will continue with installation of raw water lines in addition to the other utilities in the

area. This expansion is a private project and as such, is not an expected cost to the City of Cody.

ESTIMATED IMPROVEMENT COSTS AND RECOMMENDATIONS

TREATED WATER SYSTEM IMPROVEMENT COSTS AND RECOMMENDATIONS

The following estimated costs are figured based on 2022 dollars and do not consider inflation within the next planning cycle.

- *Treated Water Storage Maintenance*
  - Continue inspection schedule for interior of tanks.
  - Recoat all iron fittings at Beck Lake and North Cody Tanks
    - Estimated Cost: $50,000
  - Inspect/re-seal glass fused panels of North Cody Tank as necessary.

- *Replace Treated Water Pressure Reducing Valves*
  - Replace 11th Street and 13th Street PRVs
  - Replace Canyon Meadows and PP&L PRVs
  - Replace Draw and Date Street PRVs
  - Replace Walmart and 8th Street PRVs
  - Replace 19th Street PRV
    - Estimated Cost per PRV: $213,200
    - Estimated Total Cost: $2,635,000

- *Renovate the Treated Water Pump Stations*
  - Replace all pumps, valves, fittings, and pipes in the Valley View and North Cody pump stations. Pumps are reaching the end of expected design life.
    - Estimated Cost for Valley View Pump Station: $210,800
    - Estimated Cost for North Cody Pump Station: $200,000
    - Estimated Total Cost: $410,800

- *Replace all undersized treated water waterlines and all cast iron, ductile iron, and asbestos cement pipes.*
    - *Estimate Total Cost for Priorities 1-20: $41,600,000*

- *Treated Water Annexation Areas*
  - Keep conversations open with those desiring to connect to City services in potential annexation areas and analyze proposed improvements to identify potential impacts on the City System. Size treated water extensions based on hydraulic modeling analyses.

- Continue general maintenance on the treated water system
  - Bi-annual valve exercising
  - Annual PRV inspections
  - Annual SMP connection inspections

- Annual or Bi-annual Leak detection
- Annual Fire Hydrant Exercising

The total cost of recommended treated water system improvements for the 2020-2030 planning cycle: $44,700,000.

RAW WATER SYSTEM IMPROVEMENT COSTS AND RECOMMENDATIONS

The following estimated costs are figured based on 2022 dollars and do not consider inflation within the next planning cycle.

Structural Improvements Needed

- *Raw Water Pump Station Filter System Installation / Pump Station Upgrades*
  - Cody Canal Pump Station Upgrade and Filtration System
    - Estimated Cost: $1,323,000
  - Beck Lake Pump Station Upgrade and Filtration System
    - Estimated Cost: $1,060,000
- *Raw Water Storage Tank Maintenance*
  - Inspect and clean the interior of the tank, Fall 2021
  - Cleaning, Blasting, Re-coating
    - Estimated Cost: $285,000
- *Raw Water System Expansion*
  - Central Avenue Reconstruction
    - Estimated Cost: $1,225,000
  - The Softball Field Expansion
    - Estimated Cost: $1,490,000
  - Mountain View/29th Street Transmission Line
    - Estimated Cost: $1,370,000
  - Panorama View Expansion – no expected cost to the City

Total cost of recommended raw water system improvements for the 2020-2042 planning cycle: $6,753,000.

Non-structural Improvements Needed

- Begin implementing a mandatory watering timeframe: No watering allowed between 10:00 am to 4:00 pm in conjunction in with the existing even/odd day system.

RATE STRUCTURE AND BUDGET:

The cost to own and operate the treated and raw water system dictate the revenue requirements that Cody needs to meet. There are many different budgeting needs, but for the purpose of this study, they have been grouped into the following five categories:

- *Operation and Maintenance (O&M)*
- *O&M Emergency Fund*
- *Scheduled Capital Improvements – Treated Water and Raw Water*
- *Treated and Raw Water System Rehabilitation and Replacement*
- *Debt Service Expenditures*

Projected system costs have been added up and projected into the future to show future system needs. Where applicable, future costs include increases for inflation and growth. Inflation has been estimated at approximately 3% annually, while growth has been estimated at 1.3% annually. Projected system revenues based on existing water rates and other revenues have also been projected. These have been balanced to facilitate meeting CIP goals.

Rate increases proposed to the City to meet their objectives are below.

Recommended Annual Rate Increases

Year	Percent Rate Increase
2023	8.0%
2024	8.0%
2025	8.0%
2026	8.0%
2027	8.0%
2028	8.0%
2029	8.0%
2030	8.0%
2031	8.0%
2032	6.0%
2033+	2.0%

SUMMARY

The City's raw and treated water systems are in decent condition, but continued upgrades and maintenance are needed to sustain the systems. The Capital Improvement Plan identifies needed repairs and replacements over the next 20 years to keep the systems operating as needed. As CIP goals are accomplished, the system will do the following: reduce operating costs, improve system operation, provide more robust fire flows, and reduced water loss/waste. Completing proposed rate increases facilitate improvements that will reduce life-cycle costs for the systems and improve the City's capacity to provide safe drinking water to Cody's citizens.