



**City of Greeley Water & Sewer Department
Engineering Division**

Advanced Meter Infrastructure Project

**WaterSMART: Water and Energy Efficiency
Grants for Fiscal Year 2022
Grant Application
November 1, 2021**

PREPARED FOR:

Bureau of Reclamation Financial Assistance Support Section
Attn: Mr. Josh German P.O. Box 25007, 84-27133 Denver, CO 80225



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TECHNICAL PROPOSAL AND EVALUATION CRITERIA

EXECUTIVE SUMMARY

Stewardship of precious water resources is a benchmark by which future generations will judge the City of Greeley's current citizens and water leaders. As a proactive step, in July 2020, the City of Greeley launched an Advance Metering Infrastructure Project (AMI Project) to install aging and inaccurate water meters. The AMI Project demonstrates the City's ongoing commitment to honor the call to water stewardship. As of October 2021, over 5,898 AMI meters have been installed in the Phases I and II Greeley's AMI Project.

Providing real-time water management capabilities has delivered around the clock vital water use and leak detection information to our customers and staff. Through the AMI Project, the City's residents and businesses has reduced water consumption, fixed leaks and resolved water issues. Popularity of the AMI Project has increased and customers are increasingly requesting new advanced AMI meters. Over 7,000 customers have signed-up for the City's WaterSmart software, which paired with AMI meters provides the City with the ability have a focused and data-driven approach in assisting customers manage their water use.

Using this initial momentum, Greeley is seeking a Phase IV AMI Project grant to expand the installation of advanced meters and allow wider adoption of water management software for our customers. Completion of Phase IV will cover 90 percent of all customers with AMI resources. The Phase IV Greeley AMI Project will convert the remaining 11,193 outdated meters (8,879 residential; 2,314 commercial/wholesaler purchaser accounts) to AMI meters equipped with advanced, wireless technology. The requested funds of \$2,000,000 cover costs to purchase the AMI meters to be integrate Greeley Water's Supervisory Control and Data Acquisition (SCADA) system.

This project delivers wide-spread benefits. It will:

- Provide the technology necessary to conserve water supplies: at least 475 acre-feet/year (AFY) in improved meter accuracy, 280 AFY in leak detection/elimination, and 392 AFY in water conservation, for a total savings of 1,146 AFY or 4.5 percent annually.
- Provide 24/7 real-time monitoring and alert capabilities that will detect high usage and leaks.
- Reduce pumping and treatment requirements associated with saved water, which will reduce energy usage and associated greenhouse gas emissions.
- Give Greeley's water customers safe, secure, real-time access to their water usage through an online customer portal. Accurate information allows customers to proactively partner with the City in its conservation efforts by monitoring and adjusting their personal usage—a feature that will be especially beneficial to commercial and landscape customers who have higher usage rates and thus, higher water bills.
- Deliver accurate metering of all water flows, potentially helping to reduce raw water purchases for lower rates overall.
- Positively impact public health by replacing existing meters, of which 67 percent contain lead.

Date | 10-25-2021

Applicant | Greeley Water & Sewer Dept., Engineering Division

City | Greeley

County | Weld

State | Colorado

Project Length | 3 years

Completion | Dec. 2025

On Federal Facility | No

- Lower overall water use, which will help to reduce new raw water purchases and scale down the size of future water resource infrastructure projects, saving the City significant costs and lowering water rates overall.
- Allow Greeley to meet or exceed Safe Drinking Water Act requirements to reduce finished water exposure to lead and prevent leaching of lead into drinking water supplies.
- Support the Bureau of Reclamation’s (BOR) goals to manage, develop and protect water in an environmentally and economically sound manner.

Category Application | A

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Funding Group | Group II

Grant Funding Request | \$2,000,000.00

Non-Federal Matching Funds | \$5,526,964.84

Total Project Cost | \$7,526,964.84

Unique Entity Identifier | VJG3QJJKZ1X6



Water Supply The majority of future growth along Colorado’s Front Range is projected to occur in northern Colorado, with Greeley’s population by 2024 estimated at approximately 133,000. Along with significant growth comes significant water demand.

Greeley owns surface water rights in four major river basins—the Cache la Poudre River, Big Thompson River, Laramie River and Colorado River—and operates six water storage reservoirs year-round as part of its public drinking water system. The high mountain reservoirs are Barnes Meadow, Comanche, Hourglass, Milton Seaman, Peterson, and Twin Lakes. The reservoirs capture spring snowmelt, and water is released to meet Greeley’s water demands.

In 2021, Greeley has launched an innovative water supply and storage project that will allow further water sustainability. The Terry Ranch Project will serve Greeley water only in times of drought and is an aquifer storage and recovery project (greeleygov.com/services/ws/trp).

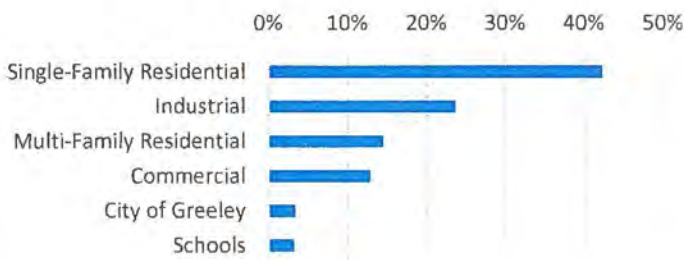
Situated in a semi-arid environment and recognizing the very real possibility that certain water supplies may dwindle or no longer be available

Greeley offers one of the most robust water conservation programs in Colorado. With just over 13 inches of rainfall per year, Greeley is considered a semi-arid climate, which means local water supplies are scarce and must be used prudently.

in as little as 10 to 15 years, the City of Greeley looks to this project to bolster water conservation and increase Greeley’s water sustainability.

Current Water Uses Greeley has a mixture of Residential, Industrial, Commercial, and Institutional (ICI) water users. Greeley also treats and delivers water to three nearby municipalities and rents water (10,000 to 20,000 AFY) to agriculture in adequate water years. Figure 1 shows the break down by customer class.

Figure 1: Annual Water Usage by Customer Class



PROJECT LOCATION

The AMI Project is located in the City of Greeley, located at 40.4233°N, 104.709°W, in a region known as northern Colorado, approximately 49 miles north/northeast of Denver (see Figure 2). Greeley is the Weld County seat and the largest City in the county, with a population now exceeding 111,000 people. Total population served in 2020 was 149,512, which includes wholesale water-purchasing municipalities near Greeley. The City’s elevation is 4,658 feet above sea level. The City has a total area of 30,730 acres. Greeley’s long-range growth area adds an additional 27,599 acres to the City’s size.

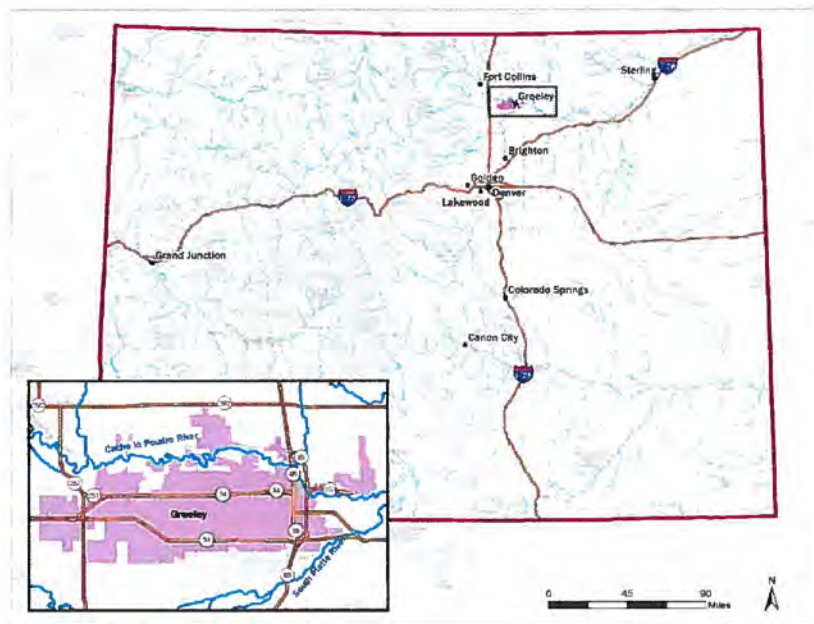


Figure 2: City of Greeley Location

TECHNICAL PROJECT DESCRIPTION

The AMI Project Phase IV will continue to enhance Greeley's water stewardship and conservation, with the planned project taking three years to implement. The proposed project timeline is from summer 2022 through December 2025. The City proposes to purchase and install 11,193 Badger E-series AMI meters (8,879 residential; 2,314 commercial/wholesaler purchaser accounts) and hire a third party contractor, such as UMS in Raleigh, NC, for installation services, project setup and initiation, and software integration.

The Phase IV AMI Project meters will allow 90 percent of existing residential, commercial, industrial, and water purchaser on AMI. From a previously installed AMI meters, the City has first-hand noticed the key benefits of AMI which include enabling water customers, particularly high water users, to monitor real-time water usage and allow the Greeley's Water Department to locate leaks in real-time. These benefits will promote an anticipated total 4.5 percent annually in water savings once all the new AMI meters are installed. These savings are enumerated in detail in the "Quantifiable Water Savings" section below.

EVALUATION CRITERIA

A. Quantifiable Water Savings

Describe the Amount of Estimated Water Savings *For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project. Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.*

Quantifiable water saving and improved water management have been shown when switching from standard volumetric meters to AMI smart meter. AMI meters provide real time, two-way communication electronically for both City staff and customers. With the Phases I and II AMI smart meters, the City has been able to mitigate water leaks and losses, improve water conservation techniques and educate customers on how to reduce water usage. AMI provides extra controls to manage water during water emergencies, shortages and droughts, and to enforce water conservation standards by existing City codes. By having additional access to real-time, daily meter readings (rather than once-per-month readings), the City estimates it can reduce non-revenue water by a significant amount (see below). Additionally, meter accuracy will significantly increase (from 0.5 to 0.1 gallons per reading), and operational staff time will become more available to enhance the existing leak detection program.

Given Phase I and II AMI rollout occurred just recently, there is limited data to conduct a pre- and post-statistical analysis. However, the City been able to use the current AMI data to quantify leaks as described below. The City has attempted to estimate the most accurate, reasonable, and conservative quantities of water that could be saved with the new 11,193 Badger Beacon AMI meter system. Assumption are described below in further details. In summary, Greeley believed is can save:

- Non-revenue water (meter accuracy)- **475 AFY**
- Improved leak detection- **280 AFY**
- Improved water conservation- **392 AFY**

The total water savings is 1,146 acre-feet per year or 4.5 percent annually.

Describe Current Losses

Please explain where the water that will be conserved is currently going and how it is being used. Consider the following: a. Explain where current losses are going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)? b. If known, please explain how current losses are being used. For example, are current losses returning to the system for use by others? Are current losses entering an impaired groundwater table becoming unsuitable for future use? c. Are there any known benefits associated with where the current losses are going? For example, is seepage water providing additional habitat for fish or animal species?

Currently, Greeley’s annual water demand on a rolling, five-year average is 8,242,510,000 gallons or 25,295 acre-feet. Treated sources of water loss include:

- Water seeping into soils surrounding distribution and customer piping;
- Water seeping into soils from over-watered lawns;
- Runoff from overwatering, which seeps into surrounding soils and eventually enters the South Platte River alluvial aquifer, and;
- Building sources, such as leaking toilets, which ends up in the City’s wastewater collection/treatment system.

Source	Rate	Total
Leaking toilet	0.5 gallons per minute (gpm)	21,500 gallons per month (gal/mo)
Drip irrigation	1 gpm	43,200 gal/mo
Garden watering	2 hours @ 5 gpm	18,000 gal/mo
Garden watering	2 hours @ 10 gpm	36,000 gal/mo
Unattended water hose	1 night (9 hrs.) at 10 gpm	5,400 gal/mo
Broken service lines	1 night (9 hrs.) @ 15 gpm	8,100 gal/mo
	1 day @ 15 gpm	21,600 gallons
	1 week @ 15 gpm	151,200 gallons
	1 month @ 15 gpm	648,000 gallons

Describe Support/Documentation of Estimated Water Savings

Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal. In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are **not** sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.

Three categories of water savings can be accomplished with the AMI Project.

- 1) Increase accuracy of meter readings (non-revenue water)
- 2) Improved leak detection
- 3) Improved residential water conservation.

Additional details are provided in the “Municipal Metering” section below.

1. Increase accuracy of meter readings (non-revenue water)

The existing City of Greeley meters are Badger Recordall Disc meters with an operating range of 0.5 to 25 gpm and a low-flow rate of 0.25 gpm. The proposed new AMI meter will be the E-Series Ultrasonic meter with an operating range of 0.1 to 32 gpm and an extended low-flow rate of 0.05 as shown on the attached meter data sheets. From the Journal of AWWA, the article *Apparent Losses Caused by Water Meter Inaccuracies at Ultralow Flows* discusses how water meters have inaccuracies in the low flow and high flow ranges that impacts non-revenue water and utility revenue. The article noted that approximately 16 percent of all domestic water consumption occurs in flows below 1 gpm indicating a water savings component with increase meter accuracy. The noted changes in accuracy from 0.5 to 0.1 gpm could impact low flow meter readings of approximately 4,047 ac-ft. (25,295 ac-ft. * 16%) of water each year.

Furthermore, based on the *Texas A&M AgriLife Research – Consideration for adopting AMI and AMR paper*, water loss is greatly reduced for utilities that have AMI features that notify of unauthorized use and meter tampering in real time which limit the severity of the major water loss. This is a non-estimated non-revenue water that could be reduced with the AMI meters. *San Jose Water – How AMI Systems Are Driving Water Conservation* noted that AMI data can also alert water utilities about suspicious changes in water use and trigger early response. This helps identify leaks in the distribution network before water even reaches a residence or commercial location. Most utilities estimate that 10 percent to 30 percent of distributed water is lost due to leaks before it even reaches customer meters. Within the water distribution system, AWWA's 2007 *State of the Industry* reported estimated losses at 10-20 percent throughout the nation.

The Greeley staff considered that current meter readings are taken once a month and have a low-flow range accuracy of 0.5 gpm that correlates to a reading every 43,200 minutes (1,440 minute per day * 30 days = 43,200 minutes/month). The new meters will take readings every 15 minutes and have a low-range accuracy of 0.1 gpm. This means that the City will now take an additional 2,880 readings per month (43,200 minutes/15 minutes). Each reading has an accuracy of ± 0.4 gallons, which corresponds to 1,152 gal per meter per month or 13,824 gallons per year (2880 x 0.4 gal/meter reading = 1,152 gal/meter/month = 13,824 gal/meter/year) not registered per meter. The City plans to replace 11,193 meters, resulting in 154,732,032 gallons not registered. **This potential increased accuracy of meters reading could result in a savings of 475 acre-feet of water each year.**

2. Improved leak detection

Over the last 14 years, the City has detected an annual average of approximately 10 residential leaks, detection of which is typically delayed for at least a month given the current monthly meter-reading schedule. Leaks in the irrigation system leak down rather than up and may go unnoticed until water surfaces or a large bill arrives. Toilets, sometimes referred to as silent leaks, may leak for months before a homeowner realizes. Within implementation Phase I and II AMI Project, Greeley's customers become more aware of leaks and began resolving them. Greeley will also be able to track residential leaks better and target customers with leaks more accurately and quickly. Because of AMI the city of Yakima, Washington needed to hire a full-time person to work with customers on leak detection.

Greeley considered the article *AWWA OpFlow – Savings Multiplied: Conserve Water and Energy to Maximize Efficiency, Reduce Emissions* that US households can waste an average of 11,000 gallons

annually from running toilets, dripping faucets, and other leaks. The *US EPA Statistics and Facts* estimates the average family can waste 9,400 gallons annually from household leaks. If the volume of 9,400 gallons of water could be conserved with AMI notifications to customers, the City of Greeley could potentially save 105,214,200 gallon each year or **322 ac-ft. per year on leaks alone**. (9,400 gallons x 11,193 AMI meters)

According to the *Journal of AWWA - Apparent Losses Caused by Water Meter Inaccuracies at Ultralow Flows* investigated residential water leaks and found that 21.9 gpd per residence of estimated indoor water use water waste because of leakage. Using literature value of 21.9 gpd x 365 days/year x 11,193 AMI meters would provide 89,471,245.50 gallons each year or **275 ac-ft. per year on leaks** as an example of different methodology.

Since Phases I and II of the AMI Project have been implemented, Greeley detected 328 leaks in the system from July 2020 to September 2021 from the 5,898 AMI meters installed equaling a 5.5 percent leak rate. A leak is determined automatically by the metering system whenever flow occurs continuously for longer than 24 hours. Based on Greeley’s data leaks were approximately 80 percent minor (264/328) and 20 percent major (64/328).

Phase I and II AMI: Reported Leak Rates	
Leak Rate (GPH)	No. of Occurrences
<10	264
10 – 30	52
30 – 60	9
>60	3

Using Greeley’s current AMI data, it is estimated that 622 customers will detect leaks with an additional 11,193 AMI meters (5.5% of 11,193 meters). Specifically for Greeley, 80 percent of leaks are defined as less than ten gallons per hour defining 498 customers with potential minor leaks (80% of 622 meters) and 124 customers with major leaks (20% of 622 meters). Without AMI, it would take a customer at least 30 days to discover a leak. From *U.S. Environmental Protection Agency (EPA) WaterSense – Water Efficiency Management Guide Bathroom Suite* defined a constantly running fill valve on a tank toilet as wasting between 0.5 to 3 gpm and therefore the City defined a minor leak as a rate of 0.5 gallons per minute resulting in **10,756,800 gallons per year or 33 ac-ft. in minor leaks** (0.5 gpm x 60 min/hr. x 24 hr./day x 30 days x 498 customers). Using the *U.S. Environmental Protection Agency (EPA) WaterSense – WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities* defined a broken distribution line or service line as 15 gallons per minute and therefore the City defined this flow rate as a major leak that results in **80,352,000 gallons per year or 247 ac-ft in major leaks** (15 gpm x 60 min/hr x 24 hr./day x 30 days x 124 customers). **The City believes it can save a total of 280 acre-feet per year with leak improvements.**

3. Improved residential water conservation

Greeley as a water budget made up of four tiers (efficient, inefficient, excessive and unsustainable) to incentivize those who stay within their budget. Potential savings can be generated with the AMI Project as customers are able to monitor their use compared to their budget throughout the month. In drought situations, when customers are asked to decrease their water budgets by 20 to 80 percent, **a potential savings of 1,600-6,400 acre-feet per year could be generated**. Additionally, Greeley intends to add commercial, industrial and multi-family accounts to the water budget rate structure program in the future, which will result in even more savings through the AMI Project.

The AMI Project aligns with a number of State, regional and City best management practices targeting water conservation and curbing water losses through rates. Current water customers have their meters read monthly and wait at least 34 days to receive their water bill for that cycle. The project will eliminate these delays and provide immediate, 24/7 access to data regarding leaks and excessive water use. Accounting for water losses that are currently unable to be billed to clients due to inaccurate, outdated meters will help the City generate additional revenue.

The *Texas A&M AgriLife Consideration for adopting AMI and AMR* research paper states that AMI/AMR system improve conservation in two main ways. First is notification of both the utility and customers of major and minor leaks and atypical use patterns that can help reduce the volume of lost and waste water. Second, collecting data can offer customers greater access to detailed information of their use than previously possible. As part of the Phase I and II AMI Project, Greeley has launched its WaterSmart customer portal that has more than 7,000 account registered. Water Conservation Program and Utility Billing has teamed-up to support water conservation methods using AMI. The outdoor audit program is already booked one month in advance in 2022 with a majority of customers who are on AMI and understand their outdoor irrigation habitats are causing higher water consumption. From an internal water efficiency study, water audits conducted will save 9 acre-feet annual from the 1,476 customer audits conducted.

From literature review in AWWA Opflow, the article “*Detect Leaks and Conserve water with AMI*” highlighted the benefits by the City of Fountain Valley, California with the installation of an AMI system for 55,000 residential customers and thousands of commercial customers. A City of Santa Barbara AMI Business Case study by Westin Engineering, Inc. stated “The industry-standard water conservation savings estimate for AMI systems is 20% water demand reduction of 20% of customers.”

Fountain was able to reduce total water demand by 30% whereas Greeley estimated a total demand conservation of only 4% (20% water demand reductions in 20% of the customers). City staff is optimistic that more than 20% of customers will achieve water conservation savings from AMI, and perhaps overall savings will be higher. However, City staff feels that there will be a range of savings its customers will achieve (e.g., not all City customers will achieve a 20% savings), so the 20% demand reduction of 20% of City customers is a sound and conservative estimate for use in this business case analysis.

For Greeley water conservation (20 percent water use reductions in 20 percent of the customers) equates to approximately 392 AFY (25,295 AFY/28,902 customers x 20% water reduction x 20% of customers x 11,193 meters).

In short, Greeley believes it can save at least 1, 146 acre-feet per year with the AMI Project.

- Non-revenue water (meter accuracy)- **475 AFY**
- Improved leak detection- **280 AFY**
- Improved water conservation- **392 AFY**

Type of Infrastructure: Municipal Metering

Municipal metering projects can provide water savings when individual user meters are installed where none exist to allow for unit or tiered pricing, when existing individual user meters are replaced with advanced metering infrastructure (AMI) meters, and when new meters are installed within a distribution system to assist with leakage reduction. To receive credit for water savings for a municipal metering project, an applicant must provide a detailed description of the method used to estimate savings, including references to documented savings from similar previously implemented projects. Applicants proposing municipal metering projects should address the following:

- a. **How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions and supporting data.**

Increased accuracy of meter readings (non-revenue water)

The existing City of Greeley meters are Badger Recordall Disc meters with an operating range of 0.5 to 25 gpm and a low-flow rate of 0.25 gpm. The proposed new AMI meter will be the E-Series Ultrasonic meter with an operating range of 0.1 to 32 gpm and an extended low-flow rate of 0.05 as shown on the attached meter data sheets. From the Journal of AWWA, the article *Apparent Losses Caused by Water Meter Inaccuracies at Ultralow Flows* discusses how water meters have inaccuracies in the low flow and high flow ranges that impacts non-revenue water and utility revenue. The article noted that approximately 16 percent of all domestic water consumption occurs in flows below 1 gpm indicating a water savings component with increase meter accuracy. The noted changes in accuracy from 0.5 to 0.1 gpm could impact low flow meter readings of approximately 4,047 ac-ft (25,295 ac-ft * 16%) of water each year.

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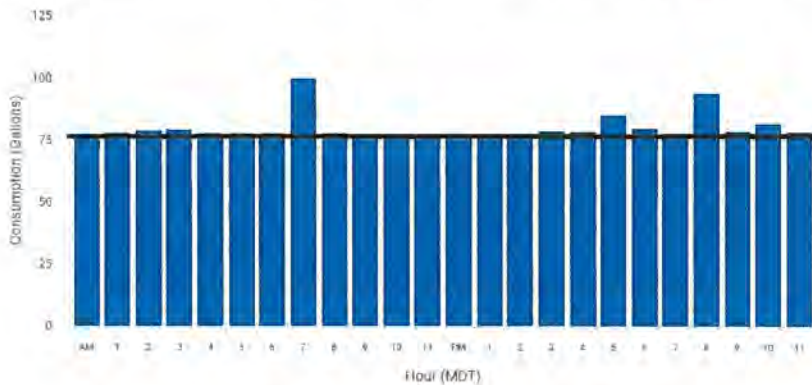
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With Phase I and II AMI implemented, Water and Sewer along with Utility billing is experiencing customer interface with leak detections. Since September 2021, Water Conservation has been running weekly leak reports and alerting customers of leaks. For example, residential customer “A” below had a 77 gallon per hour leak. With the older meter read monthly, this leak would have resulted in a 55,400 gallon monthly loss. However, this outdoor leak was detected within seven days results in 12,936 gallons or only a 23 percent loss. Since then customer “A” engaged in the WaterSmart portal which provide text, voice and/or email alerts instantaneously which may have results in less than 1,848 gallon loss in the future.



Since Phases I and II of the AMI project have been implemented, Greeley detected 328 leaks in the system from July 2020 to September 2021 from the 5,898 AMI meters installed equaling a 5.5 percent leak rate. A leak is determined automatically by the metering system whenever flow occurs continuously for longer than 24 hours. Based on Greeley’s data leaks were approximately 80 percent minor (264/328) and 20 percent major (64/328).

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City defined a minor leak as a rate of 0.5 gallons per minute resulting in **10,756,800 gallons per year or 33 ac-ft in minor leaks** (0.5 gpm x 60 min/hr x 24 hr./day x 30 days x 498 customers). Using the U.S. Environmental Protection Agency (EPA) *WaterSense – WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities* defined a broken distribution line or service line as 15 gallons per minute and therefore the City defined this flow rate as a major leak that results in **80,352,000 gallons per year or 247 ac-ft in major leaks** (15 gpm x 60 min/hr x 24 hr./day x 30 days x 124 customers). The City believes it can save a total of 280 acre-feet per year with leak.

Improved residential water conservation

Since the 1900s, Greeley has had a strong conservation ethic as evidenced by being one of the first cities in Colorado to be fully metered and have a conservation plan in place. Furthermore, Greeley has had watering restrictions in place since the early 1900s. In 1997, a specific Water Conservation program started. Evidence of this robust Water Conservation Program is clear since **Greeley is the only utility in Colorado that has both a water budget rate structure and proposed water tap fees that promote water conservation.**

Greeley implemented a water budget rate structure that calculates an individual water budget for each resident. The water budget is based on the indoor and outdoor water needs specific to each single-family residence, including persons per household, any landscaped area around the house, and real-time weather data. During the non-watering season (November 1 – April 14), the total water budget is comprised only of indoor use; during the non-watering season (April 15 – October 31), both indoor and outdoor use make up the total water budget. The indoor budget is based on the number of people in a household (persons per household), with each person allocated 45 gallons per person per day, (gpcd) for every day of the year. Therefore:

$$\text{Indoor budget} = 45 \text{ gpcd} \times \text{persons per household} \times \text{number of days in billing period}$$

The outdoor budget is based on the actual water need of bluegrass (the “irrigation water requirement,” which is based on real-time Greeley weather) and the resident’s total “irrigable area” (in square feet), which is the total area of the non-pervious surfaces around the house. Although the irrigation water requirement (IWR) is based on water needs of bluegrass, it is more than adequate to sustain other plants and trees. The irrigable area includes rights-of-way, shrubs, and trees but excludes driveways, sidewalks, and rooftops. The IWR is calculated on a daily basis (in gallons per square foot), and every household is given the IWR for their water budget. Therefore:

$$\text{Outdoor budget} = \text{Irrigable area} \times \text{total IRW for each billing period}$$

A water budget is made up of four tiers (efficient, inefficient, excessive and unsustainable) to incentivize those who stay within their budget. Potential savings can be generated with the AMI Project as customers are able to monitor their use compared to their budget throughout the month. In drought situations, when customers are asked to decrease their water budgets by 20 to 80 percent, **a potential savings of 1,600-6,400 acre-feet per year could be generated.** Additionally, Greeley intends to add commercial, industrial and multi-family accounts to the water budget rate structure program in the future, which will result in even more savings through the AMI Project.

The AMI Project aligns with a number of State, regional and City best management practices targeting water conservation and curbing water losses through rates. Current water customers

have their meters read monthly and wait at least 34 days to receive their water bill for that cycle. The project will eliminate these delays and provide immediate, 24/7 access to data regarding leaks and excessive water use. Accounting for water losses that are currently unable to be billed to clients due to inaccurate, outdated meters will help the City generate additional revenue.

A Texas A&M AgrilLife Research paper (*Consideration for adopting AMI and AMR*) states that AMI/AMR system improve conservation in two main ways. First is notification of both the utility and customers of major and minor leaks and atypical use patterns that can help reduce the volume of lost and waste water. Second, collecting data can offer customers greater access to detailed information of their use than previously possible. As part of the Phase I and II AMI Project, Greeley has launched its WaterSmart customer portal that has more than 7,000 account registered. Water Conservation Program and Utility Billing has teamed-up to support water conservation methods using AMI. The outdoor audit program is already booked one month in advance in 2022 with a majority of customers who are on AMI and understand their outdoor irrigation habitats are causing higher water consumption. From an internal water efficiency study, water audits conducted will save 9 acre-feet annual from the 1,476 customer audits conducted.

From literature review in AWWA Opflow, the article “*Detect Leaks and Conserve water with AMI*” highlighted the benefits by the City of Fountain Valley, California with the installation of an AMI system for 55,000 residential customers and thousands of commercial customers. A City of Santa Barbara AMI Business Case study by Westin Engineering, Inc. stated “The industry-standard water conservation savings estimate for AMI systems is 20% water demand reduction of 20% of customers.”

Fountain was able to reduce total water demand by 30% whereas Greeley estimated a total demand conservation of only 4% (20% water demand reductions in 20% of the customers). City staff is optimistic that more than 20% of customers will achieve water conservation savings from AMI, and perhaps overall savings will be higher. However, City staff feels that there will be a range of savings its customers will achieve (e.g., not all City customers will achieve a 20% savings), so the 20% demand reduction of 20% of City customers is a sound and conservative estimate for use in this business case analysis.

For Greeley water conservation (20 percent water use reductions in 20 percent of the customers) equates to approximately 392 AFY (25,295 AFY/28,902 customers x 20% water reduction x 20% of customers x 11,193 meters).

- b. **How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?**

The current distribution system losses and/or potential for reductions in water use by all water customers is calculated as a percent difference between total metered water deducted from metered water produced by both water treatment plants. Greeley has also participated in annual M36 reporting requirements to further investigate system losses.

- c. **For installing individual water user meters, refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. In the absence of such studies, explain in detail how expected water use reductions have been estimated and the basis for the estimations.**

The Badger Meter Company has done several studies on actual water savings that followed municipal utilities installing advanced metering analytics in the City of Merced, CA (BEA-CS-02480-EN-01, July 2017); the Highway 71 Water District No. 1 in Alma, AR (BEA-CS-02420-EN-01, May 2017); and at the University of California–Merced (BEA-CS-01607-EN-01, May 2015).

The studies revealed the following benefits:

- Leaks were detected faster and more accurately.
- Non-revenue water loss was tracked daily.
- The new system was easily deployed and flexible. Increased operational efficiency and cost savings were realized by all three utilities.
- Reduced fleet trucks on the road and employee costs generated cost savings.
- Water savings enabled the utilities to hire new employees and replace older meters.
- Customers got leak notifications quicker than waiting for their bill and could respond faster.
- Customers easily accessed water usage via smartphone or tablet, which gave them direct insight into their water usage and knowledge needed to make habit changes.
- More detailed water usage information enabled each utility to proactively reach out to customers who may have an issue and quickly resolve billing questions.

Supporting resources for water savings due to increased meter accuracy

The article titled *Apparent Losses Caused by Water Meter Inaccuracies at Ultralow Flows* (*Journal of AWWA*) discusses how water meters have inaccuracies in the low- and high-flow ranges that impact non-revenue water and utility revenue. The article noted that approximately 16 percent of all domestic water consumption occurs in flows below 1 gpm. **The noted changes in accuracy from 0.5 to 0.1 gpm could impact low-flow meter readings of approximately 3,927 ac-ft (24,545 ac-ft * 16 percent) of water each year.**

Supporting resources for water savings due to improved leak detection

The article titled *Savings Multiplied: Conserve Water and Energy to Maximize Efficiency, Reduce Emissions* (*AWWA OpFlow*), indicates that U.S. households can waste an average of 11,000 gal/year through running toilets, dripping faucets, and other leaks. The U.S. EPA Statistics and Facts estimates the average family can waste 9,400 gallons annually from household leaks. If these 9,400 gallons could be conserved with AMI notifications to customers, the City of Greeley could potentially save 165,000,000 gallons each year, or 432 AFY, in small leaks alone.

Another paper by Badger Meter entitled *Beacon Advanced Metering Analytics (AMA) Powered By ORION Cellular Technology Increases Efficiency and Reduces Water and Energy Consumption for City of Merced, California* found that after the City of Merced installed a new Beacon AMA system that help detect leaks that were only losing 8.3 gpm which would historically go undetected for a month for a total water loss of 360,000 gallons.

In *How AMI Systems Are Driving Water Conservation* (San Jose Water), it was stated an AMI system can also alert water utilities about suspicious changes in water use and trigger early response. This helps identify leaks in the distribution network before water even reaches a residence or commercial location. Most utilities estimate that 10 percent to 30 percent of distributed water is lost before it even reaches customer meters due to leaks. In addition, *AWWA's 2007 State of the Industry* reported estimated losses at 10 to 20 percent in water distribution systems throughout the nation.

This level of leak detection savings is also supported through the paper *Detect Leaks and Conserve water with AMI (AWWA Opflow)*, which documented the results of the City of Fountain Valley, California, installing an AMI system for 55,000 residential customers and thousands of commercial customers. The City of Fountain found that improved accuracy and data of the new AMI system allow Fountain Valley to identify 35 small leaks per month (down from 35 leaks per week initially after AMI meters installed) after the initial installation of AMI meters. From correlating data from the current AMI data from Greeley, there are potential to 498 minor leaks and 124 major leaks. The article titled *Leverage AMI for Sustainability (AWWA OpFlow)* describes how AMI systems can be a fundamental conservation component by detecting and stopping leaks in multiple ways, including metered leak detection, district metering leak detection, and acoustic leak detection. The City of Greeley has averaged approximately 37 distribution leaks and 10 transmission leaks per year for the past 14 years (this number represents only leaks actually found and repaired). **If the City estimates that a major leaks are 15 gpm (very low and conservative) and flow for one month before repair, the loss could equate to approximately 247 AFY.**

Supporting resources for water savings due to improved water conservation

In 2015, the Water and Sewer Board, Greeley City Council and the Colorado Water Conservation Board approved an updated version of its *Water Conservation Plan (WC Plan)*. The WC Plan includes existing audits, rebates, watering restrictions as well as new programs, like commercial and residential landscape code changes, water budget rate structure, WaterSmart customer portal, investigating AMI technology and turf reduction incentives for customers. The WC Plan update projects a water demand reduction of 1,820 acre-feet over a 20-year planning horizon.

The AMI Project dovetails seamlessly into the City's overall Water Conservation Program.

Since 2008, the Water Conservation Program evaluate and implemented a water-budget-based rate structure for each single-family residential customer, including information on each household's irrigated area and forecasted demand based on weather data. This empowered customer with information that would allow them to take an active role in monitoring and lowering their consumption (and in turn their water bills) through a water-budget-based rate structures. Part of the rate model includes targeted communication pieces to customers who regularly exceeded water budgets and flagging exceptionally high-water bills and users who grossly exceeded their water budget.

Integrating the AMI Project with the water budget rate structure will foster increased customer interaction and trigger improved water conservation by customers. The estimated conservation is supported by research completed by *Texas A&M AgriLife Research, Consideration for Adopting AMI and AMR*, which states that AMI/AMR systems improve conservation in two main ways—first, notifying both the utility and customers of major and minor leaks and atypical use patterns can help reduce the volume of lost and wasted water, and second, collecting data can offer customers greater access to detailed water use information than previously possible.

The same City of Fountain, California, study mentioned previously found that installing an AMI system reduced total water demand by 30 percent. Whereas Greeley estimates a total demand conservation of only 4 percent (20 percent water demand reductions in 20 percent of the customers). “The industry-standard water conservation savings estimate for AMI systems is 20 percent water demand reduction of 20 percent of customers.” (*City of Santa Barbara AMI Business*

Case, Westin Engineering Inc.) City staff is optimistic that more than 20 percent of customers will achieve water conservation savings from AMI, and perhaps overall savings will be higher. However, City staff feels that there will be a range of savings its customers will achieve (e.g., not all City customers will achieve a 20 percent savings), so the 20 percent demand reduction of 20 percent of City customers is a sound and conservative estimate for use in this business case analysis.

The article *AMA Implementation at Badger Meter Headquarters – Practicing What You Preach* (Beacon *AMA*), noted that after installing AMA or AMI meter system at the Badger Meter headquarters, the company detected leaks in a machine that was running water continuously, which equated to wasting 5,880 gallons per week. The City of Greeley has approximately 500 industrial and commercial high-intensity water users. **If each of these customers found one leak per year of the same size, the City could save approximately 469 AFY (5,880 gallons * 52 weeks/year * 500 customers).**

The article *Consideration for Adopting AMI and AMR* (Texas A&M AgriLife Research) describes research that found that non-estimated, non-revenue water is greatly reduced for utilities that have AMI features that notify of unauthorized use and meter tampering in real time.

- d. **Installation of distribution system meters will not receive points under this criterion. Accordingly, these projects must be paired with a complementary project component that will result in water savings in order for the proposal to receive credit for water savings, e.g., pipe installation using upgraded materials, or individual water service meters.**

Greeley will be upgrading individual water service meters. The Support/Documentation session provides additional details.

- e. **What types (manufacturer and model) of devices will be installed and what quantity of each?**

The City proposes to purchase and install 11,193 Badger E-series AMI meters and LTE-M cellular endpoints. The manufacturer and model of devices to be installed are listed below:

Equipment - AMI Meters, Cables, TTE Cellular Endpoint	Quantity
3/4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	8,879
1" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	1,045
1.5" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	646
2" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	474
3" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	69
4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	38
6" Badger Electromagnetic meter	25
8" Badger Electromagnetic meter	14
10" Badger Electromagnetic meter	1
12" Badger Electromagnetic meter	2
LTE-M Cellular Endpoint, Twist Tight	11,193

- f. **How will actual water savings be verified upon completion of the project?**

The estimated average annual water savings resulting from the AMI Project will be determined by subtracting metered water totals used by all water customers and water purchasers from the metered water produced totals from both water treatment plants. Actual water savings will be

verified from meter readouts using the Water Operations' SCADA software and the meter readouts from water treatment plants' produced water, and from the SCADA system, which will be linked during the software integration work to be done by UMS.

Savings from the AMI Project can also be verified by comparing the percent of water budgets that each resident uses year to year. With the ability to monitor use daily, it is expected that the percent of residents' water budgets used will decrease. For instance, a residence using 110 percent of its water budget on average would now have the ability to use AMI to alter water use habits. The water budgets were designed to be generous initially; accuracy will be narrowed over time as customers become more aware of their use and modify their habits accordingly.

B. Renewable Energy

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water efficiency project (e.g., reduced pumping).

In 2004, Colorado voters passed the first renewable energy standard which highlights the water saving of renewables. Since then the Public Utilities Commission (PUC) have taken several actions including addressing emission and water through resource bids as a step in factoring externalities in resource planning. PUC also included a 10 to 20 percent renewable energy standard for municipalities by 2020 and 100 percent clean energy by 2050 for utilities serving 500,000 or more customers.

Water Conservation Programs is consistent with overarching goals of the New Energy Economy and future sustainability.

For water and sewer utilities like Greeley, majority of energy needs come from source and conveyance, treatment (water and wastewater treatment plants) and distribution mains (pump and lift stations). Greeley's source and conveyance system is 100 percent surface water driven and engineered as a gravity feed system requiring limited power need. High mountain reservoirs and conveyance systems utilize energy at instrumentation and SCADA systems locations. These instruments use solar panels as power supplies when feasible (months with no snow). Greeley's three treatment plants energy demands are significant to provide safe, reliable drinking water and protecting the environment during the wastewater treatment process. To offset Greeley's energy needs, all three treatment plants use solar energy. **In fact Greeley's three treatment plants exceed the PUC's renewable goal with 20-39 percent of energy needs based on renewable solar energy.** Greeley's distribution mains uses engineering methods to maximize gravity when feasible. Given the topography and relative location of the treatment plants, pump and lift stations are needed for water and wastewater conveyances. However the most effective way to reduce energy use and greenhouse gas emission in the distribution stage is by fixing system leaks. Water that is lost carries with it all the energy that it took to get to that point (from source, treatment and distribution mains). Saving water will truly save energy. In *Aspen Colorado's 2008 Environmental Sustainability* report, their aggressive main pipe leak detection program, reduced its water use to just 25 percent of its record high usage and decreasing peak demands.

To leverage Greeley's AMI investment beyond just water meter readings, the **City has been and will continue to utilize the daily data to detect anomalies, proactively respond to leaks and manage our water system more strategically such as long-term peak shifting objectives** as discovered in the Aspen report. With the combined use of WaterSmart software and AMI smart meters, Greeley has and will continue to target individual homes and businesses infrastructure not only for water saving but improve human behaviors toward water and energy. Applications like AMI meters and WaterSmart

customer portal software have proven to have a direct change on human behavior by either customers having control of the water consumption with data and analysis, and/or social norms marketing tools to foster water conservation behavioral changes and social sustainability. A combination of infrastructure and human behaviors determine both water and energy consumption.

Greeley is updating the *Water Conservation Plan* around AMI data using a triple bottom line approach (economic, environmental, and social) which will allow new ways to connect water and energy programs. In 2022, the *Water Conservation Plan* will be updated and will look at utility partnerships on water and energy conservation to increase in efficiency program participation to save resources, improve customer satisfaction, and potentially lower costs as outline in the *2013 Western Resource Advocates Conservation Synergy report*. Greeley acknowledges Colorado’s focus on the federal Weatherization Assistance Program and the State’s Energy Saving Partners program to merge the Governor’s Energy Office and Colorado Water Conservation Board objectives and seek to gain additional sustainability with water and energy.

With Greeley’s Water Conservation program as being one of the largest programs in the state with an annual budget more than \$500,000, the program seeks cooperative opportunities to encourage the adoption of water-energy nexus. Since 2008, the Water Conservation Program has provided approximately 230 residential irrigation audits per year and issued 1,650 toilet rebates and 2,223 washer rebates. From 2013-2020, the Water Conservation Program has served 4,857 Greeley water customers with indoor and outdoor rebate, audits and incentives. Upgrading water-efficient devices such as faucets, showerheads and toilets correlates to energy savings.

1. If quantifiable energy savings is expected to result from the project, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.

A water-energy demand side management is a challenge to determine. From the *2021 Water Energy Nexus AMI pilot final report (ET17PGE8171)* from California onsite household electric or gas use statistically did not reduce with AMI water meters but did results in the reeducation of individual household water use and indirect energy use from water delivery. Therefore, Greeley will focus on energy-water nexus savings through electric generation at the water/wastewater facilities and the distribution system. Greeley has two Water Treatment plants (Bellvue and Boyd Lake) and one Wastewater Treatment Plant. Using a three-year average from 2018-2020, the following chart provides the electricity consumed per acre-feet of water treatment.

	Electric Consumed (kWH)	Treatment (AFY)	Water/Wastewater Services (kWH/AFY)
Bellvue	1,395,402	19,849	70
Boyd Lake	633,299	5,843	108
Wastewater Plant	7,448,781	7,873	946
Total	9,477,482	33,565	1,125

Greeley estimates with AMI technology a total water savings of 1,146 AFY from:

- Non-revenue water (meter accuracy)- 475 AFY
- Improved leak detection- 280 AFY
- Improved water conservation- 392 AFY

The three water saving categories were distributed between water treatment and wastewater treatment energy demands. For instance, non-revenue water is through to be 100 percent linked to the water treatment energy demands but improved leak detection and water conservation water savings is a proportion linked between water and wastewater energy demands. It is assumed that 70 percent of water savings will be distributed to water treatment energy demands and 30 percent as wastewater treatment demands based on water treatment totals (*i.e.* 25,692 AFY water treatment/ 35,565 AFY total treatment). In turn, this would allocate 945 AFY ($475 \text{ AFY} + 0.7(280+392 \text{ AFY})$) toward water treatment energy needs and 201 AFY ($0.3(280+392 \text{ AFY})$) towards wastewater treatment energy demands.

To ensure Greeley’s estimates were reasonable, it was compared to the *Watts in a Drop of Water: Saving at the Water-Energy Nexus* November 2014 American Council for an energy-Efficient Economy white paper and the *Water Conservation=Energy Conservation* a report for the Colorado Water Conservation Board 2009.

Source	State	Year	Water services (kWh/million gallons per year)		
			Source and conveyance	Treatment	Distribution
CEC	CA	2005	0-14,000	100-16,000	100-1,200
EPRI	USA	2002	300-1,824		NA
ISAWWA	IL	2012	218-12,890 (range for all utility sizes)		
			1,560-2,912 (range of group means)		
	IN	2012	1,981-2,198 (range for three utilities)		

Sources: Klein et al. 2005 (CEC), Goldstein and Smith 2002 (EPRI), ISAWWA 2012 (ISAWWA)

Based on this assumption, the estimated water treatment energy savings is 168,210 kilowatt hours per year ($178 \text{ kWh/AFY} \times 945 \text{ AFY}$) and waste water treatment is 190,146 kilowatt hours per year ($946 \text{ kWh/AFY} \times 201 \text{ AFY}$). **The AMI Project could result in saving 358,356 kilowatt hours per year from water and wastewater treatment.**

Three distribution pumps were considered for energy demands and savings. These included the Boyd Lake pumps (operating from April to October only), Mosier pump station and Zone 4 pump station.

The Boyd Lake Water Treatment plant (Boyd Lake) is required to pump water to Greeley while in operations from April to October each year and is considered a peaking plant (limited seasonal operation). This plant has a capacity for 38 million gallons per day (MGD) and the Bellvue Water Treatment plant (Bellvue) has a capacity of 35 MGD. Any savings of water will reduce the pumping of approximately 52% (38 MGD divided by 73 MGD) of the saved water while the Boyd Lake plant is operational (6 months each year). **This results in an estimated energy savings of approximately 99,719 kilowatt hours per year from the Boyd Lake pumps.**

Water is also pumped into the City’s zone 3 and zone 4 by the Mosier pump station and the Zone 4 pump station. These two pump stations pump approximately 30% of the City water year around. Any water savings can reduce pumping in these two stations by approximately 121,559 Kilowatt’s (KW) per year. **The total estimated energy savings of reduced pumping throughout Greeley is 121,559 kilowatt hours per year from the Mosier station and Zone 4 pumps.**

The AMI Project could result in a total of 579,634 kilowatt hours annually saved from:

- Water and Wastewater Plants: 358,356 kilowatt hours
- Pumps: 221,278 kilowatt hours

2. How will the energy efficiency improvement combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions.

Colorado's changing climate presents a broad range of challenges. Future estimates project temperatures rising an additional 2.5 to 5°F by 2050. With increased temperatures comes shifts in local weather and impacts to energy demands. Greeley has a long tradition of beneficial use of water coupled with early conservation policies going back to the early 1900's resulting in a balance built environment that provides both the ecological benefits of landscaping, such as shade, which mitigates "heat island" effects and lowers the reduced water on groundcover. From the article *2021 Scientific Journal- When small is not beautiful: The unexpected impacts of trees and parcel size on metered water-use in a semi-arid city* indicates a higher ratio of vegetation cover to parcel size tended towards less water consumption when the landscape is shaded. Shade from trees are key in both offsetting impacts of climate change, reduction in greenhouse gas emissions, and saving water. Also based on *Landscaping for energy conservation: Fact Sheet No. 7.225* from the Colorado State University Extension, effective landscaping can reduce summer cooling bills by 50 percent or more and winter heating bills by up to 25 percent. Reeducation of winter heat loss is caused by the reduction of wind velocities near the building. This, in turn, reduces the pressure difference between the inside and outside of the building, leading to a reeducation of heat loss by as much as 50 percent on cold windy days.

Greeley was designated a "Tree City USA" by the Arbor Day foundation in 1980 and the 2060 Comprehensive Plan included a policy to maintain this designation. The University of Northern Colorado in Greeley achieved the designation of "Tree Campus USA" in 2013, showcasing Greeley's investment in irrigated landscapes. In 2016, a Water Efficiency Tactical Team (WETT) was formed with the goal of developing conservation strategies to reduce outdoor watering at non-essential turf/high water use City parks and open space landscapes. Greeley's interdepartmental group have formed a partnership documented in the *Landscape Policy Plan for Water Efficiency*. This document provides the foundation and detailed goals and policies for the City to further advance efforts in the areas of education, regulation, and incentives which maintains Greeley's existing quality landscape and urban forest. Water and Sewer has budgeted and used funds to support the WETT's efforts. Greeley's Forestry department also implements the Plant the Shade program supplying low cost or free trees to residents who volunteer.

With the installation of AMI meters, customers, for the first time, are seeing first-hand their irrigation water demands. Homeowners have consulted the Water Conservation Program for guidance on how to reduce water consumption while maintaining their landscaping. The Water Conservation Program, in turn, is increasing efficiency improvements and offsetting climate change through a rebate program called Life After Lawn which incentivizes homeowners and practitioners to design, install, and maintain water-efficient landscapes. In 2021, over 70,000 square feet of non-essential turf has been replaced with water-efficient ecological positive habitats. These design elements include shaded landscapes since the Water Conservation

Program understands the long-term water and energy saving benefits to the homeowners and the environment.

3. **If the project will result in reduced pumping, please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements and energy usage?**

The Boyd Lake Water Treatment plant (Boyd Lake) is required to pump water to Greeley while in operations from April to October each year and is considered a peaking plant (limited seasonal operation). This plant has a capacity for 38 million gallons per day (MGD) and the Bellvue Water Treatment plant (Bellvue) has a capacity of 35 MGD. The Boyd Lake plant operates five 800 horsepower (hp) vertical turbine pumps with a discharge pressure of 56 to 135 psi (depends on flow rates) and average of 95 psi. Any savings of water will reduce the pumping of approximately 52% (38 MGD divided by 73 MGD) of the saved water while the Boyd Lake plant is operational (6 months each year). **This results in an estimated energy savings of approximately 99,719 kilowatts per year.**

Water is also pumped into the City's zone 3 and zone 4 by the Mosier pump station and the Zone 4 pump station. The Mosier pump station has three centrifugal pumps with hp ranges from 25 to 100 and two vertical turbine pumps with 300 hp. The Mosier pump station also has four centrifugal pumps with hp ranges of 200 to 300 and five vertical turbine pumps with hp ranging from 1 to 150. These different pumps has the pressure range of 82 to 130 psi and an average of 101 pressures. These two pump stations pump approximately 30% of the City water year around. **Any water savings can reduce pumping in these two stations by approximately 121,559 kilowatts per year.**

The total estimated energy savings of reduced pumping throughout Greeley is 221,278 kilowatts per year.

4. **Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.**

As mentioned above, energy savings estimates are based on energy data from two water treatment plants and one wastewater plant and the distribution system. The two water treatment plants are the point of diversion for water source and the wastewater plant is the point of release.

5. **Does the calculation include any energy required to treat the water, if applicable?**

Correct, the calculation includes energy to treat raw water and wastewater effluent.

6. **Will the project result in reduced vehicle miles driven, in turn reducing greenhouse gas emissions? Please provide supporting details and calculations.**

The AMI Project would eliminate the need for field customer service representative to drive through the service area to collect meter readings each weekday, resulting in an estimated fuel savings of 450 gallons per year along reduction of truck maintenance (oil changes, tires, etc.). In addition, the water conservation team members have been able to resolve customer leaks or water consumption questions with AMI data without a need for an on-site audit. With over 250

audits annually, estimated fuel savings is 100 gallons per year. **The total fuel savings is estimated at 500 gallons per year.** Using the *EPA Greenhouse Gas Equivalencies Calculator* (www.epa.gov/energy/greenhouse-gas-equivalencies-calculator) **an estimated 4.9 metric tons annually of greenhouse gas emissions would be eliminated and would therefore reduce Greeley's carbon footprint.**

7. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).

Greeley is renewable energy conscious through leasing of City properties with installed solar arrays at three Water and Sewer Department facilities including Bellvue Water Treatment Plant, Boyd Lake Water Treatment Plant, and the Wastewater Treatment Plant.

The Water Treatment Plants uses solar energy as a renewable energy source. Solar fields provides an estimated 20-26 percent of the plant's energy needs for the Boyd Lake Plant and 30-39 percent for the Bellvue Plant. Greeley continues to be energy smart by upgrading the plants with LED lights.

The Wastewater Treatment Plant uses both solar energy and biogas as renewable energy sources. A 0.5Mw solar field provides an estimated 10-15 percent of the plant's energy needs. In addition, biogas generated in the anaerobic digesters is used to heat two boilers. These boilers are used in a heat exchange loop to heat the digesters in order to maintain them at the required temperatures needed for the digestion process. Using the biogas produced by the Wastewater Treatment Plant off-sets the amount of natural gas needed for the same process. In 2011, the facility received the Xcel Energy Custom Efficiency Achievement Awards for reducing energy costs.

C. Sustainability Benefits

This criterion prioritizes projects that address a specific water and/or energy sustainability concern(s), including enhancing drought resilience, addressing the current and future impacts of climate change, and resolving water related conflicts in the region. In addition, this criterion is focused on the benefits associated with the project, including benefits to tribes, ecosystem benefits, and other benefits to water and/or energy supply sustainability.

Enhancing Drought Resiliency

1. Does the project seek to improve ecological resiliency to climate change?

Indirectly, water saving through the AMI Project provides controls for raw water demands resulting in improved ecological resiliency. Specifics are the following:

- **Instream Flows:** Less municipal demands by the City will allow for increased flows for aquatic habitat and downstream environmental uses from the four river basins. Additionally, water pursuant to ownership in the Greeley Irrigation Company (GIC) are released to the river between April 15th and October 31st providing additional ecological benefits. GIC company shares are primarily used for non-potable irrigation at this time and the AMI meters will decrease unnecessary outdoor water use.
- **Drought controls:** The AMI Project will be a critical improvement necessary to control water use during drought conditions and allows Greeley to enforce the 2021 Drought Emergency Plan. According to EPA's 2021 *Using Advanced Metering Infrastructure in Water Quality Surveillance and response System*, AMI is a surveillance component that can generate data and alerts that indicate system tampering and minimize consequences. The Drought

Emergency Plan allows water usage in a budget that would incrementally decrease at higher drought level years and encourage increased water conservation efforts through landscape conversions. In drought situations, when customers are asked to decrease their water budgets by 20 to 80 percent, a potential savings of 1,600-6,400 acre-feet could be generated.

Urban Forestry and Landscapes: AMI is a water conservation technique. As customers become aware of their irrigation use, AMI data is used to reinforce water conservation methods and landscape alternatives.

2. **Will water remain in the system for longer periods of time? If so, provide details on current/future durations and any expected resulting benefits (e.g., maintaining water temperatures or water levels).**

With decreased demand, especially during the hot summer months, municipal water will remain within the City of Greeley's storage facilities for longer. Currently, the City maintains a drought level of all reservoir storage, but water levels fluctuate within each reservoir. By decreasing water use the reservoirs will stay at a higher level, benefiting wildlife habitat surrounding the reservoirs, maintaining water temperatures and dissolved oxygen demands for aquatic species. These reservoirs include six High Mountain Reservoirs on Federal Land as mentioned in the Executive Summary above.

The City also owns previously mined gravel pits for storage and direct releases to meet return flow obligations to the South Platte River, known as Poudre Ponds. With decreased use by municipal customers, less return flow obligations will be required on the river and Poudre Ponds will maintain higher storage levels. The City currently operates a Fishing is Fun grant with the Division of Wildlife. The Poudre Ponds complex is designed for recreational space for the general public, and increased fish habitat along the Poudre River. With stream sustainability in mind, Greeley has planned water releases from the Poudre ponds between July and the end of September within the Poudre River to provide additional instream flows which in turns maintain water temperatures and stabilize dissolved oxygen demands for aquatic habitat. Additionally, other water rights in the system are released to the Poudre River between prime aquatic habitat needs of April 15th and October 31st, annually.

3. **Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project or is subject to a recovery plan or conservation plan under the Endangered Species Act (ESA).**

Within the Greeley area, there are eight endangered species:

- Preble's Meadow Jumping Mouse (Threatened)
- Eastern Black Rails (Threatened)
- Piping Plover (Threatened)
- Whooping Crane (Endangered)
- Pallid Sturgeon (Endangered)
- Monarch Butterfly (Candidate)
- Ute Ladies' tresses (Threatened)
- Wester Prairie Fringed Orchid (Threatened)

The Greeley area also hosts ten migratory birds that are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Greeley is specifically involved in the Platte River Recovery Implementation Program (PRRIP) through the Colorado wing known as the South Platte Water Related Activities Program (SPWRAP). Greeley sits on the SPWRAP Board and is committed to retiming flows in the South Platte River for the Pallid Sturgeon, Whooping Crane, and Piping Plover habitat in Nebraska.

The AMI Project will not adversely affect these species but in fact enhance habitat, water savings and the ability to control instream flows. In addition, as mentioned under Other Project Benefits, water conservation programs like Life After Lawn increases habitat for birds and Monarch Butterflies. Through the AMI Project and water saving, less municipal demand by the City will result in less diversions to storage, potentially allowing for increased flows to the South Platte River which will benefit the Platte River endangered species. Greeley also relies on Colorado-Big Thompson (C-BT) water as a municipal supply. The AMI Project will allow the curbing of customer use in drought restrictions. By decreasing C-BT supplies it will aid in the protection of Colorado River endangered species such as Humpback Chub and Razorback Sucker.

4. Please describe any other ecosystem benefits as a direct result of the project.

Since the initiation of the Phase I and II AMI Project, the Water Conservation Program has noted increased customer care inquiries mainly due to irrigation habitats. Customers are stocked by the volume of water needed for irrigating traditional turf. As part of the *Landscape Policy Plan for Water Efficiency*, a sub-element of the *Greeley 2060 Comprehensive Plan*, retrofitting or preventing non-essential turf with naturalized or native plants is a key talking point with customers. Because of the AMI data increases customer interaction/education, the Water Conservation Program has noted increase outdoor water audit participation and increase interest in the Life After Lawn rebate program. Life After Lawn incentivizes customer to retrofit non-essential turf with water-smart xeric landscapes. Outdoor water audits are currently scheduled for three months during the irrigation season in 2022.

Alternative water smart landscapes will increase water-efficiency, reduce noise and carbon pollution from lawn mower exhaust, and provide local habitat for birds, bees, and insects. With 75 percent of our crops relying on pollinators, creating food in an urban habitat improves ecological resiliency even during drought conditions (www.ree.usda.gov/pollinators).

5. Will the project directly result in more efficient management of the water supply? For example, will the project provide greater flexibility to water managers, resulting in a more efficient use of water supplies?

The ability to efficiently manage water supplies is enhanced by the AMI Project. The Water Resources Division is currently relying on customer usage data based on monthly readings. As part of Greeley's robust water efficiency, a water resources Integrated Water Management Resource Plan (IWRP) is in the process of being updated this year. The IWRP coordinates the sources and users of water for effective and efficient local water management through modeling. Greeley's future IWRP will be based on scenarios such as climate change, population and industrial growth, water use, the prioritized risks and uncertainties and regional conditions. The AMI meters on the customer end will allow better calculations of water production versus the end use and provide realistic parameters for the IWRP. Because of AMI data, the City will be

able to better model demand forecasts with climate-adjusted forecasts for different future conditions.

In addition, as mentioned above, water losses within the system are an important aspect of water management. This allows the City to identify and fix additional losses in the system. By reducing user end use, water can be stored for instream flow and habitat management.

According to the *FEMA Fact Sheet: Climate Resilient Mitigation Activities Aquifer Storage and Recovery*, FEMA is encouraging communities to incorporate methods to mitigate the impacts of climate change into eligible Hazard Mitigation Assistance funded risk reduction activities on Climate Resilient Mitigation Activates. One such method would be to expand ecosystem service benefits and drought mitigation activities is Aquifer Storage and Recovery (ASR). In 2021, Greeley has launched an innovated ASR project that will further water sustainability. The Terry Ranch Project will serve Greeley water only in times of drought and is an ASR project. Since ASR is subsurface storage technology, it is more resilient and protected than more traditional reservoir storage techniques and would decrease the surface water withdrawals during a drought thus protecting surface ecosystems further.

Addressing a specific water and/or energy sustainability concern(s).

1. Explain and provide detail of the specific issue(s) in the area that is impacting water sustainability, such as shortages due to drought and/or climate change, increased demand, or reduced deliveries.

Northern Colorado's water supplies and our resource resiliency are being tested by wildfire and climate change, drought, economic growth, and municipal demand hardening impacts.

▪ Wildfire and Climate Change:

The state's two largest wildfires on record, the Cameron Peak Fire (2020) and East Troublesome Fire (2020), impacted more than 400,000 acres of critical watershed serving Northern Colorado communities and agriculture. Watersheds, Greeley's most fundamental infrastructure, have been vastly impacted, adding the responsibility to lead recovery efforts and more uncertainty to our adaptive management of the snowpack and runoff. These wildfires were aggressive and destructive on a scale not seen previously; they were fueled by bark beetle killed forests, drought, dry vegetation, and prolonged heat from August into October and November. Additionally, increased temperatures are driving ET demand higher in the watersheds and in our service area.

▪ Drought:

Several severe droughts since 2002 have impacted the region and shown to have prolonged impacts. While the past two years have been average or above average snowpack for the Northern Colorado mountains, the drought and systemic shortage in the Colorado River basin stands to have lasting impact on Northern Colorado and its communities. Northern Colorado Municipalities, led by Greeley, are coordinating with the Colorado Water Conservation Board and Interbasin Compact Committee on how to support the Drought Contingency Plan and considerations for a Demand Management program.

In 2021, City of Greeley produced an update to its drought response action plan, and the City is currently updating its IWRP to meet future climate and drought challenges.

▪ **Economic Growth:**

Northern Colorado has a robust and growing regional economy that has flourished from our agricultural roots. Irrigated agriculture, municipal and industrial users are all heavily reliant on Upper Colorado River water from the Colorado Big Thompson Project (C-BT).

Economic growth has transferred more than 90 percent of C-BT units from agriculture into municipal ownership, and that has diminished the regions drought reserve or surplus water that could transfer into municipal use in a prolonged severe drought.

▪ **Municipal Demand Hardening:**

Demand shift from potable to non-potable further hardens potable supply needs. Because high quality water suitable for drinking is in short supply, municipal systems have made large investments to convert large outdoor irrigated areas to non-potable raw water from agricultural irrigation ditches.

Greeley continues to mitigation of these risks through collaborative efforts within Northern Colorado and beyond. Greeley has partnerships with other utilities, conservation districts, irrigation companies, local, state and federal entities to collaboratively address the complexities in the management and operation of the local watersheds. Greeley's efforts are designed to reduce further risks and protect water supplies for public health and safety.

2. **Explain and provide detail of the specific issue(s) in the area that is impacting energy sustainability, such as reliance on fossil fuels, pollution, or interruptions in service.**

Northern Colorado is one of the fastest growing regions in the nation. Between 2010 and 2020 the region grew by 700,000 people ([Major growth in Northern Colorado shown by 2020 Census \(lestel-meade.com\)](https://www.lestel-meade.com)). This has caused increased traffic congestion, energy consumption, and fossil fuel usage. Northern Colorado has also experienced interruptions to both the water and energy sectors due to two extreme fire events. The 2020 East Troublesome and Cameron Peak fires impacted energy service to Estes Park during the fires. In the aftermath, municipalities had to trade water when the river water quality was poor due to sedimentation and runoff. These fires have been a lesson in increasing energy grid resiliency to a warmer and drier future and community collaboration in sustainability practices.

3. **Please describe how the project will directly address the concern(s) stated above. For example, if experiencing shortages due to drought or climate change, how will the project directly address and confront the shortages?**

The AMI Project provides a boost to water management responses during water shortages. AMI meters provides extra controls to manage water during water emergencies, shortages and droughts and enforce water conservation standards by existing City codes (*Title 20, Chapter 3, Article III Division 4*). In drought situations, when customers are asked to decrease their water budgets by 20 to 80 percent, **a potential savings of 1,600-6,400 acre-feet per year could be generated.** To help conserve water resources, there is no watering from 10 am to 6 pm in Greeley. Data from the AMI meters quickly identifies customers who are not participating and will provide Greeley with the ability to alter personal behaviors with direct communication and evidence.

Enforcement of water restrictions without smart meters required considerable personnel expense, as someone has to physically inspect the site. The AMI meters would eliminate this need and expedite water saving responses.

In addition, the AMI data would be able to increase Greeley's ability to model water resources more accurately with the IWRP. With this AMI Project, 90 percent of Greeley would be on AMI meters.

- 4. Please address where any conserved water as a result of the project will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.**

AMI will allow the City to better use what water it already has before needing to seek new water resources, in turn, will increase water reliability and security for Greeley water customers, and benefit other water users and river ecology in Northern Colorado. For example, implementing AMI-related savings could offset the planned purchase of agricultural water and associated drying of agricultural lands. Protecting the area's agricultural production and heritage is a primary focus of the City. Further, reducing water losses and increasing customer conservation through AMI could allow Greeley to reduce future river depletions, which could translate to increased flows that benefit river ecology and morphology downstream. Further, conservation through AMI could reduce the need for and size of future planned water storage reservoirs and plant upgrades. Reservoir projects often have multiple environmental impacts; therefore, reducing customer use could translate to fewer environmental impacts.

The AMI Project will also help address water reliability issues from drought situations and effects from climate change that could decrease the reliability of storage supplies and surface water rights. With a decrease demand and increase water savings through AMI, more water is available to maintain or increase storage levels. This water can help support the City through multi-year droughts or be rented to agriculture. With less production at the plant, more water can remain in storage for later use, and surface flow rights can be sent downstream to meet return flow obligations or to agriculture for irrigation. More water in storage for future years means more water available for agriculture.

- 5. Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.**

Clearly, a growing population requires more water; however, less water is available due to hydrologic conditions (change in snowpack and drought derations) and increased use of water rights in the Cache la Poudre, Big Thompson, Colorado and Laramie River basins. In addition, competition over the Colorado River has increased significantly—and more than 40 percent of Greeley's water supplies come from the Colorado River. Rather than putting the conserved water to new use, the water conservation attributable to the AMI Project will decrease Greeley's reliance on, and competition for, these limited water resources.

- 6. Indicate the quantity of conserved water that will be used for the intended purpose(s).**

As calculated above, water conservation from the AMI Project will result in reduced raw water demand of approximately 1,146 AFY.

Other project benefits

Combating the Climate Crisis: E.O. 14008, *Tackling the Climate Crisis at Home and Abroad*, focuses on increasing resilience to climate change and supporting climate resilient development). For additional information on the impacts of climate change throughout the western United States, see: <https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREReport.pdf>. Please describe how the project will address climate change, including the following:

1. **Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.**

The AMI Project unearths the hidden benefits which follows the intent of the 2009 SECURE Water act by assessing changes to water supplies, monitoring and mitigating water risks for public health and safety, and implementing water conservation strategies to combat droughts and climate changes.

AMI data provided Greeley with the tools to coordinate and collaborate with customers and wholesale groups using the best available technology to monitor, analyze, and provide water supplies during all environmental conditions. A major conservation method is Greeley's water budgets which is based on persons per household, irrigable area of each property, and current evapotranspiration methods. With AMI meters, customers can track their water budget through their WaterSmart software and adjust to meet the need of local codes, criteria, and standards during normal to drought conditions and stay within their designated water budget. AMI allows Greeley to monitor, track efficiencies, and make adjustment quickly to counter act water demands and droughts.

In addition, AMI data provides the Water Conservation Program with a data-driven approach. As increased temperatures and longer growing seasons are projected with climate change, Greeley's water conservation is focused on methods to tackle increased evaporation and potential irrigation water requirements in the future. A prime conservation program is eliminating non-essential turf through the Life After Lawn program. This program incentivizes homeowners and practitioners to design, install, and maintain high quality water-efficient landscapes by removing non-essential turf for water smart xeric landscapes. Kentucky bluegrass (traditional turf) and maintenance (fertilization/mowing) increase greenhouse gas emissions that contribute to global warming and thus climate change (*Bartlett, and James, 2011: A model of greenhouse gas emissions from the management of turf on two golf courses. Science of the Total Environment, 409:1357-1367*). Customers AMI data will provide measurements needed to calculate water savings, and in turn, provide data-driven results needed to secure funding to increase this programs acreage. The 2022 Life After Lawn goal is to eliminate 3.5 acres of non-essential turf and to reduce water irrigation by 20 percent.

2. **Does this proposed project strengthen water supply sustainability to increase resilience to climate change?**

The EPA, through the Climate Change Adaptation Resource Center (ARC-X) has provided adaptation strategies to inform and assist utilities in identifying potential alternatives to increase climate change resiliency. One key strategy is to model and reduce irrigation water demand. As shown above the AMI Project will decrease outdoor irrigation demands through leak detection, customer education, and conservation management practices. Another strategy is through water

conservation and demand management, in which the AMI Project will give more control to City staff to monitor demand and decrease usage with specific customers.

Furthermore, AMI data in an innovated tool to better manage water and provide fast trend detections. AMI data allow Greeley to use decision science for short-, mid- and long-term planning—integrating all elements of water resources to prioritize water benefits. From *Global Water Resources – The Real Smart Grid for Water: Ensuring Water Sustainability via Infrastructure and Information*, AMI data alters water consumption behavior and brings to light the personal impact each consumer has on Greeley’s water resources. In turn, water conservation strengthen water supply sustainability.

3. Will the proposed project establish and utilize a renewable energy source?

The AMI Project will not establish a new renewable energy source but will greater utilize the renewable energy sources that are already present. Greeley had the forethought many years ago to build a gravity based municipal system. By not using pumps to move water many miles to the citizens less energy is required through pumps.

As previously mentioned the treatment plans have already built small-scale solar projects to reduce energy consumption and by decreasing demand, Greeley will be able to further utilize the solar technology present.

4. Will the project result in lower greenhouse gas emissions?

Yes. As described in the Renewable Energy section the AMI will:

- Reduce the need for field customer services to drive to each meter
- Save energy at the water treatment, wastewater treatment, and distribution systems
- Increase water smart landscapes to reduced emissions (i.e. trees, retrofit non-essential turf)

Disadvantaged or Underserved Communities E.O. 14008 and E.O. 13985 support environmental and economic justice by investing in underserved and disadvantaged communities and addressing the climate-related impacts to these communities, including impacts to public health, safety, and economic opportunities. Please describe how the project supports these Executive Orders, including:

1. Does the proposed project directly serve and/or benefit a disadvantaged or historically underserved community? Benefits can include, but are not limited to, public health and safety through water quality improvements, new water supplies, new renewable energy sources, or economic growth opportunities.

The proposed Advanced Meter Infrastructure project will directly serve and benefit the City of Greeley, a “disadvantaged community” as defined in 16 U.S. Code §1015. Additional information on Greeley’s income and poverty level is provided in #2 below.

As explained elsewhere in this application, the AMI Project is expected to reduce Greeley residents’ water usage through provision of real-time consumption data, leak detection, and water budget enhancements. Increased water conservation will decrease long term water acquisition and will reduce customer water rates. Further, the project will reduce operational expenses in line with reduced water usage and by eliminating the need for manual meter reads.

2. **If the proposed project is providing benefits to a disadvantaged community, provide sufficient information to demonstrate that the community meets the disadvantaged community definition in Section 1015 of the Cooperative Watershed Act, which is defined as a community with an annual median household income that is less than 100 percent of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status.**

The U.S. Census Bureau QuickFacts

(<https://www.census.gov/quickfacts/fact/table/greeleycitycolorado,CO/INC110219>) lists Greeley's 2019 annual median household income at \$57,586. The same source lists the 2019 annual median household income for the State of Colorado as \$72,331. Greeley's annual median household income is thus 79.6 percent of the statewide annual median household income and meets the definition of disadvantaged community in 16 U.S. Code §1015. Further, based on the 2019 American Community Survey (ACS; <https://www.census.gov/programs-surveys/acs>), 16.2 percent of persons in Greeley live in poverty compared to a statewide average of 9.3 percent.

3. **If the proposed project is providing benefits to an underserved community, provide sufficient information to demonstrate that the community meets the underserved definition in E.O. 13985, which includes populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.**

Persons of Hispanic or Latino origin represent 38.6 percent of the City of Greeley population. Latino communities are defined in Executive Order 13985 as an example of underserved communities. The proposed project will benefit the Latino community within the City of Greeley.

Tribal Benefits: *The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal Trust responsibilities. The President's memorandum "Tribal Consultation and Strengthening Nation-to-Nation Relationships" asserts the importance of honoring the Federal government's commitments to Tribal Nations. Please address the following, if applicable:*

1. **Does the proposed project directly serve and/or benefit a Tribe? Will the project increase water supply sustainability for an Indian Tribe? Will the project provide renewable energy for an Indian Tribe?**

No.

2. **Does the proposed project directly support tribal resilience to climate change and drought impacts or provide other tribal benefits such as improved public health and safety through water quality improvements, new water supplies, or economic growth opportunities?**

No.

Other Benefits: *Will the project address water and/or energy sustainability in other ways not described above? For example:*

1. **Will the project assist States and water users in complying with interstate compacts?**

Competition for water rights in the Big Thompson, Cache la Poudre, Laramie River, and Colorado River has increased as large Front Range municipalities, as well as speculative private equity investors, are acquiring water supplies in the basin. In 2019, Colorado-Big Thompson (C-BT) water became scarce, which drove the price of C-BT water to more than six times 2008

prices, or \$66,000 per unit. Greeley has long benefited from having diverse, relatively inexpensive water supplies in these four basins available for municipal (residential and commercial) and industrial growth; however, it has become clear that those water supplies may no longer be available currently and could be very scarce in as little as 10 to 15 years. Therefore, Greeley must increase its water conservation efforts, which includes implementing efficient, cost-effective and easily maintained projects like the AMI Project.

2. Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?

Water savings through the AMI Project will result in less raw water demand, resulting in reduced diversions from the four river basins to storage and treatment. This will benefit multiple sectors, including:

- **Agriculture:** Less municipal demand by the City will result in less diversions to storage, allowing for increased flows to downstream agricultural users. The City will also be able to allow farmers continued use of their surface water rights that are part of the City's "lease-back" program. The agricultural water users will have assurance that the City is doing everything it can to conserve its water resources and will only buy agricultural irrigation supplies when farmers approach the City about purchasing their water rights.
- **Municipal:** Providing real-time water management capabilities around the clock is revolutionary for municipalities. The AMI Project will allow the City to monitor and control activities during emergencies, provide data driven modeling for water resource management, and improve water conservation methodology. Detection of anomalies provides security for public health and safety within the drinking water such as backflow detection and prevention. By educating the public through WaterSmart profiles, customers can take a proactive approach on water uses and leak repairs. With AMI, notification of water issues in real-time allow Greeley to streamline processes and improve water-efficiencies.
- **Industrial:** The AMI Project will allow industrial customers the ability to actively monitor and reduce our water usage and leaks at their businesses. The industrial water users within the City are some of the bigger water users and therefore there are many different locations within their facilities that could be leaking. The City believes that the industrial users could save significant water and is demonstrated by the 42 large meters (6" to 12") that are planned to be replaced.
- **Environmental and Recreation:** Less municipal demand by the City will result in less diversions to storage, allowing for increased flows to downstream environmental uses and recreational users in the South Platte Basin. Poudre Ponds is a City water storage facility used for non-potable and augmentation water that will continue to be expanded for fishing, recreational use, and natural habitats. A decrease in potable water in outdoor irrigation due to the AMI meter catching leaks and overuse will keep Poudre Ponds at a higher level.

c. Will the project benefit a larger initiative to address sustainability?

Greeley's water system is diverse and resilient. In 2021, Greeley initiated a Drought Emergency Plan under conservative assumptions of high outdoor irrigation demands from

Greeley customers and low yields of Greeley water supplies. This is part of an initiative to address future sustainability within the system and decrease water usage to preserve water storage to get through longer drought periods. AMI meters will allow drought restrictions to be enforced up to 70 percent or 7,170 acre-feet per year in a Catastrophic Drought event.

The AMI meters will also increase short-term sustainability by providing leak detection and lessen water loss in outdoor watering. This water is costly to move through the system, takes energy to deliver to a customer, and has no return benefit when it is lost to evaporation or ground seepage.

d. Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?

Current planning by the City of Greeley projects that Greeley is approximately 12,125 AFY short of firm water supply for future population demands. Any reduced water demands, water savings, and conservations from the AMI Project will decrease the City's future supply needs and improve the City's supply reliability. Any improvements of the City's supply reliability will also benefit water users throughout Northern Colorado and the Colorado River Basin.

Greeley enters statements of opposition in many court cases to protect their rights on the river. While a decrease in water will not decrease the amount of opposition, it will aid in decreasing the need to change additional agricultural rights for municipal use. Court cases will likely increase over time and be subject to further scrutiny in the future.

D. Complementing On-farm Irrigation Improvements

Points may be awarded for projects that describe in detail how they will complement on-farm irrigation improvements eligible for NRCS financial or technical assistance.

The City of Greeley takes great pride in its agricultural heritage as demonstrated by its long history of partnerships with agriculture in Northern Colorado. Greeley has implemented a water "lease-back" program, wherein irrigation water supplies are contracted to the City of Greeley under a 10-year lease/fallow option. During average or wet hydrologic years, farmers use their irrigation supplies as normal to produce their crops; however, during dry years, the City could exercise the option to lease the farmer's irrigation supplies that is then pulled into the municipal water system. In return, the farmer receives a lease payment and fallows the farm. The City's ability to implement a robust conservation program provides incentive for farmers to participate in the lease-back program, as they will have assurance that the City will only use the farm's irrigation supplies when absolutely necessary. Additional benefits to both the City and agricultural community include:

- Supporting the local agricultural industry by allowing new farmers the opportunity to rent farms which have a "lease-back" contract and guaranteed income in dry years and providing retiring farmers an option to rent farms instead of selling them.
- Providing another option to "buy-and-dry", which removes local water resources from the community and often results in transfers of water resources to other parts of the state.
- Reducing the carbon footprint by keeping local agriculture viable rather than transporting goods from other communities.
- Improving water quality by keeping the surrounding community in agriculture rather than urban/suburban sprawl and keeping green spaces between nearby communities.

- Promoting municipal water conservation during dry years to maximize use of the leased irrigation supplies, knowing they are only available for a short time.

Greeley will continue to foster strong partnerships with Northern Colorado agricultural entities, as they are a conduit through which future water conservation and management programs can be implemented.

Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies. Provide a detailed description of the on-farm efficiency improvements. Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects or do they plan to in the future? Provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs. Provide letters of intent from farmers/ranchers in the affected project areas.

No direct on-farm efficiencies will be experienced with the AMI Project, but water savings from the project will allow Greeley to increase its annual water leases to local farmers. Greeley currently leases back approximately 10,000 to 20,000 AFY of water to farmers to enhance the local agricultural economy and heritage.

Will the proposed WaterSMART project directly facilitate the on-farm improvement if so, how? For example, installation of a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip irrigation. OR Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?

Implementing the AMI Project will maximize efficiency by allowing Greeley to continue to lease back 10,000 to 20,000 AFY of water to farmers, which enhances the local agricultural economy. The local agricultural economy also benefits from several industrial customers (usage of cheese and meat products) related to processing agricultural products and employs local Citizens of Greeley. Supplying the community with locally grown food reduces the community's carbon footprint and reduces trucking and emissions.

Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.

Not applicable.

E. Planning and Implementation

Project Planning

Does applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place.

Greeley has had a *Water Conservation Plan* in place since 1992. The existing version of the Plan is included with this grant application packet. Securing safe and sufficient water supplies for future generations of Greeley residents in the face of significant uncertainties such as drought and climate change is a major challenge. Successful stewardship of precious water resources is a benchmark by which future generations will judge the current citizens and water utility staff. The *Water Conservation Plan* for the City of Greeley has been developed to establish clear goals and to outline programs and measures to help meet the goals that will ensure a healthy and robust water supply for the future.

1. **Identify any district-wide or system-wide planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.**

In 2021 Greeley updated its *Drought Contingency Plan* to reflect the use of water budgets to achieve savings in a drought as opposed to watering restrictions only.

Greeley is also actively working with the City of Evans and City of Windsor (two of our wholesale customers) to incorporate water planning into land use planning as these adjoining cities are linked through economies, land, agriculture and resources. In addition, our wholesale providers' meters were exchanged for AMI meters in 2019 allowing our wholesale customers to analyze their water system and automatically promote water conservation through leak detection.

2. Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).

Water is a precious commodity in Colorado, and will only become more precious as Greeley's population grows and more water is needed. The mission of the Greeley Water and Sewer Department is to make sure that the community has a secure and reliable water supply. To meet this goal, the Four Point Plan was developed with the leadership of the Greeley Water and Sewer Board.

The elements of the Four Point Plan are:

- Strengthening infrastructure
- Continuing water acquisition
- Expanding storage
- Continuing water conservation

The Four Point Plan is the basis of Greeley's water planning on which all prospective plans and projects are judged. As described in sections above, the AMI Project dovetails seamlessly into the City's overall Water Conservation program by increasing meter accuracy, improving leak detection and leak elimination efforts, and promoting customer water conservation.

3. If applicable, provide a detailed description of how a project is addressing an adaptation strategy specifically identified in a completed WaterSMART Basin Study or Water Management Options Pilot (e.g., a strategy to mitigate the impacts of water shortages resulting from climate change, drought, increased demands, or other causes) For more information on Basin Studies, including a list of completed basin studies and reports, please visit: www.usbr.gov/WaterSMART/bsp.

The Colorado River Basin study included the Colorado Front Range Communities as a portion of the 40 million people the Colorado River Basin supports. Of the Representative Options identified in the report, the AMI meters meet multiple categories:

- **Reuse** – municipal wastewater. While not directly correlated, the AMI meters will decrease outdoor water use on all water users. By decreasing outdoor watering less water production will go towards outside uses and will be returned to the wastewater treatment plants through the sanitary sewer systems. This allows Greeley to reuse water to meet return flow obligations in the South Platte River and other users downstream to pick up the water for their use.
- **M&I Water Conservation** – the AMI meters will be implemented with both municipal and industrial water users. Greeley has a large industrial sector in agriculture production. The AMI meters will allow Greeley to better track key customers. Greeley will also be hiring a key customer water conservation specialist to help implement AMI data driven water conservation measures.
- **System Operations** – Modified Reservoir Operations. The decrease in water use from AMI meters will allow for modified reservoir operations and will allow the City to keep water in the reservoirs longer through the season.

- **Water Transfers and Exchanges** – The decrease in water use, and better control on customer usage, will allow Greeley to further exchange and temporarily transfer water supplies to surrounding municipalities when necessary.

Readiness to Proceed

Applications that include a detailed project implementation plan (e.g., estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates) will receive the most points under this criterion.

1. **Identify and provide a summary description of the major tasks necessary to complete the project. Note: please do not repeat the more detailed technical project description provided in Section D.2.2.4.; this section should focus on a summary of the major tasks to be accomplished as part of the project.**

With the AMI Project Phase I and II underway, the major tasks and any issues have been resolved. The Phase IV AMI Project, the City proposes to purchase and install 11,193 Badger E-series AMI meters and implement an installation contract (such as UMS in Raleigh, NC) for AMI services, project setup and initiation, and software integration. The planned project will take three years to implement with a proposed timeline from the summer of 2022 through December 2025. All phases of the AMI Project will replace 90 percent of the existing residential, commercial, industrial, and water purchaser outdated water meters. The City has proactively started the critical meter replacement process and is already engaged in replacing 5,898 AMI meters including those key accounts of the highest water use.

2. **Describe any permits that will be required, along with the process for obtaining such permits**

No permits are required to complete the project.

3. **Identify and describe any engineering or design work performed specifically in support of the proposed project.**

The engineering work has already been completed with the evaluation of different meter companies and technologies that will allow a smooth transition from existing Badger Recordall Disc meters.

4. **Describe any new policies or administrative actions required to implement the project.**

The City of Greeley Water Board and City Council have approved the planned budgets for 2022, 2023, and 2024 to execute the planned AMI meter replacement as described in this grant application and in alignment with the project schedule below.

5. **Please also include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: complete environmental and cultural compliance; mobilization; begin construction/installation; construction/installation (50% complete); and construction/installation (100% complete)**

AMI Project Schedule				
Milestone Description	Category	Start	No. Days	
Procurement				
Awarded Grant	Milestone	3/2/2022		
Complete WaterSmart Grant Agreement	Low Risk	7/1/2022		
AMI meter Purchase	Low Risk	7/31/2022	30	
Install Contractor Bid	Low Risk	9/29/2022	60	
Contractor Bid Review	Low Risk	11/28/2022	14	
Contractor Contract	Low Risk	12/12/2022	30	
Phase 1 AMI Install				
AMI Equipment Delivery	High Risk	1/1/2023	0	
Install AMI System	Med Risk	2/1/2023	280	
Complete 5,000 AMI Installs	Milestone	11/8/2023	30	
AMI meter Purchase	Low Risk	3/3/2023	30	
Phase 2 AMI Install				
AMI Equipment Delivery	Low Risk	1/1/2024	30	
Install AMI System	Med Risk	2/1/2024	280	
Complete 5,000 AMI Installs	Milestone	11/7/2024	30	
Complete 1,193 AMI Installs at indoor or landscaped locations	Milestone	5/6/2025	180	

F. Collaboration

Please describe how the project promotes and encourages collaboration. Consider the following:

1. **Is there widespread support for the project? Please provide specific details regarding any support and/or partners involved in the project. What is the extent of their involvement in the process?**

Greeley has received many letters of support from neighboring water utilities, professional organizations, different agencies, and environmental groups from Northern Colorado who support our grant application for the AMI Project. All local communities, agriculture users, environmental groups, and agencies in Northern Colorado benefit from Greeley's reduced water usage that makes existing water supplies available for other users. For example, on an annual basis, the City of Greeley leases approximately 10,000 to 20,000 AFY to local farmers around Greeley due to Greeley having adequate water supplies for the upcoming year. The decreased water use from Greeley's AMI Project will allow Greeley to lease out additional water supplies to other agricultural users in Northern Colorado.

2. **What is the significance of the collaboration/support?**

Overall, Northern Colorado has a significant growing population that requires addition water resources to supply these new demands. This increased need for water resources requires all municipalities, districts, and developers to compete for purchase or lease of limit resources. As an example, C-BT prices have increased from \$33,000 per share in 2018 to approximately

\$66,000 per share cost in 2021. The water rights in Northern Colorado are also constantly changing uses or diversion locations from only farm or ditch use to potential municipal use. This results in litigation of not injuring downstream users of the seepage or pass through water. Greeley's efforts to conserve water through the AMI Project will decrease the City's dependence on acquiring or leasing new water supplies by the estimated 1,146 AFY.

3. **Will this project increase the possibility/likelihood of future water conservation improvements by other water users?**

Although Greeley does not have any direct partners in the project other than the contractor and other municipalities (Windsor, Milliken, and Evans) that use Greeley's water, it is in the best interest of all of the water users in the basins to cooperate and do more with less. In fact Greeley converted our key accounts like Windsor, Milliken and Evans to AMI to allow those customers to take control with future water conservation improvements. The Greeley's Water Conservation Program has been actively working with Windsor and Evans' water conservation coordinators to unify regional water conservation messaging, events and educational outreach. Greeley's water conservation commitment to our customers and wholesalers remains strong since we are all shareholders in the C-BT project, which derives water from the Colorado River, one of the most over-allocated rivers in the country. During times of drought, we have seen tensions rise and the potential increase for litigation over water resources. Greeley's efforts to conserve its water supplies will provide evidence of good stewardship and increase our ability to have adequate supplies during droughts.

4. **Please attach any relevant supporting documents (e.g., letters of support or memorandum of understanding).**

Please see Appendix A—Letters of Support

G. Additional Non-Federal Funding

Total project costs for the Greeley AMI Meter Installation Project is \$7,408,536. The City's funding is 73 percent in non-federal funding for this three-year project; therefore, Greeley's share of the project's total project is \$5,408,536.

H. Nexus to Reclamation Project Activities

Points are only awarded to projects with a connection to a Reclamation project or Reclamation activity.

Describe the nexus between the proposed project and a Reclamation project or Reclamation activity. Please consider the following:

1. **Does the applicant have a water service, repayment, or O&M contract with Reclamation?**

No.

2. **If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?**

Greeley receives Reclamation water through the Colorado-Big Thompson Project. The C-BT Project owned by the Bureau of Reclamation and jointly operated with the Northern Colorado Water Conservancy District (Northern Water). Greeley is the largest municipal owner of the C-BT allotments administered by Northern Water, and C-BT water is a large and critical

component of Greeley's water supply portfolio. The AMI Project will not involve Reclamation project lands or facilities, and is located entirely within the City of Greeley.

3. Will the proposed work benefit a Reclamation project area or activity?

Colorado River Basin

- M&I Water Conservation – the AMI meters will be implemented with both municipal and industrial water users. Greeley has a large industrial sector in cheese making and beef production. Through the AMI Project, Greeley to work to individualize and track key customers water consumption. The Water Conservation Program will be hiring a key customer conservation specialist that will use AMI data and analyses approach for key customers. Greeley updating the Water Conservation Plan using a triple bottom line approach (economic, environmental, and social) that will allow to address Reclamation-wide water conservation priorities to meet local goals. One example is the Life After Lawn will focus on non-essential turf coverts to low-water-use Xeriscapes.
- Greeley relies heavily on Colorado-Big Thompson (C-BT) water as a municipal supply. AMI meters will allow the curbing of customer use in drought restrictions. By decreasing C-BT usage it will aid in the protection of Colorado River threatened and endangered species as listed in Sustainability Benefits section above.

4. Is the applicant a Tribe?

No.

PERFORMANCE MEASURES

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved or better managed, energy generated or saved). For more information calculating performance measure, see Appendix A: Benefit Quantification and Performance Measure Guidance.

By switching from standard volumetric meters that are outdated (AMR) and do not provide the capability for remote monitoring, to AMI smart meters that provide real time, two-way communication electronically for both City staff and customers, Greeley's project will result in both quantifiable water savings and improved water management. The City will be able to mitigate water leaks and losses, train customers on how to reduce water usage and help control water use during water alerts and droughts. These new remote monitoring capabilities will allow Greeley to compare customer classes and total water usage before and after installation of AMI meters.

The estimated average annual water savings resulting from the project will be determined by subtracting metered water totals used by all water customers and purchasers from the metered water produced totals from both water treatment plants; and by comparing existing water usage data to the new metered customer data, which will reflect water savings for each customer and for the entire Greeley customer base.

PROJECT BUDGET

A. Funding Plan and Letters of Commitment

Describe how the non-Federal share of project costs will be obtained. Project funding provided by a source other than the applicant shall be supported with letters of commitment that include the amount of funding commitment, date funds will be available to applicant, any time constraints on fund availability, and any other contingencies associated with the funding commitment.

Funding for Greeley’s portion of the budget will come from the City’s Water and Sewer enterprise funds. The City of Greeley Water Board and City Council have approved the planned budgets for 2022, 2023, and 2024 to execute the planned AMI meter replacement as described in this grant application.

Identify sources of the non-Federal cost-share contribution, including any monetary contributions by the applicant toward the cost-share requirement and source of funds (e.g., reserve account, tax revenue and/or assessments), any costs that will be contributed by the applicant, any third-party in-kind costs, any cash requested or received from other non-Federal entities, and and/or any pending funding requests (i.e., grants or loans) that have not yet been approved and explain how the project will be affected if such funding is denied.

Not applicable

Identify whether budget proposal includes any project costs that have been or may be incurred prior to award, such as project expenditure and amount, date of cost incurrence and how the expenditure benefits the project.

Not applicable

B. Budget Proposal

Provide a discussion of, or explanation for, items included in the budget proposal including, but not limited to, salaries and wages, fringe benefits, travel, equipment, materials and supplies, contractual, third-party in-kind contributions, environmental and regulatory compliance costs, other expenses, indirect costs

Total Project Cost Table	
Source	Amount
Costs to be reimbursed with requested Federal funding	\$2,000,000.00
Costs to be paid by the applicant (Greeley)	\$5,526,964.84
Value of third-party contributions	NA
Total Project Cost	\$7,526,964.84

Project Budget				
Budget Item Description	Quantity	Unit	\$/Unit	Total Cost
Equipment - AMI Meters, Cables, TTE Cellular Endpoint				
3/4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	8,879	AMI Unit	\$236.34	\$2,098,462.86
1" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	1,045	AMI Unit	\$354.51	\$370,462.95
1.5" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	646	AMI Unit	\$531.77	\$343,520.19
2" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	474	AMI Unit	\$797.65	\$378,084.92
3" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	69	AMI Unit	\$1,196.47	\$82,556.52
4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	38	AMI Unit	\$1,794.71	\$68,198.86
6" Badger Electromagnetic meter	25	AMI Unit	\$6,500.00	\$162,500.00
8" Badger Electromagnetic meter	14	AMI Unit	\$8,900.00	\$124,600.00

10" Badger Electromagnetic meter	1	AMI Unit	\$9,500.00	\$9,500.00
12" Badger Electromagnetic meter	2	AMI Unit	\$11,500.00	\$23,000.00
LTE-M Cellular Endpoint, Twist Tight	11,193	AMI Unit	\$134.17	\$1,501,798.39
Annual Service Units	11,193	AMI Unit	\$10.68	\$119,541.24
13.25WAT Composite Lid, Center Drilled 2" Hole	9,924	AMI Unit	\$26.00	\$258,024.00
24WAT Composite Lid, Center Drilled 2" Hole	1,269	AMI Unit	\$65.00	\$82,485.00
AMI Installation Contractor/Construction				
Meter Install Contractor: installation services	11,193	Project	Lump Sum	\$1,656,528.91
Meter Install Contractor: project setup, initiation & bonding (if required)	1	Project	Lump Sum	\$149,448.43
Meter Install Contractor: software integration	1	Project	Lump Sum	\$98,002.58
Environmental and Regulatory				
Notice of Exemption (NOE)	1	Project	Lump Sum	\$250.00
Total Project Budget				\$7,526,964.84

C. Budget Narrative

Salaries and Wages

Indicate PM and other personnel by name and title. PM must be an employee or board member of the applicant. Other personnel should be indicated by title alone. For all positions, indicate salaries and wages, estimated hours or percent of time, and rate of compensation. Labor rates must identify the direct labor rate separate from the fringe rate or fringe cost for each category. All labor estimates must be allocated to specific tasks as outlined in the applicant's technical project description. Labor rates and proposed hours shall be displayed for each task. Include estimates for compliance with reporting requirements, including final project and evaluation. Generally, salaries of administrative and/or clerical personnel will be included as a portion of the stated indirect costs. If these salaries can be adequately documented as direct costs they should be included in this section; however, a justification should be included in the budget narrative.

The AMI Project does not include budget for City staff salaries or wages. All project costs are materials costs only.

Fringe Benefits

Identify rates/amount, what costs are included in this category, and the basis of the rate computations. Federally approved rate agreements are acceptable for compliance with this item.

The AMI Project does not include budget for City staff fringe benefits. All project costs are material costs only.

Travel

Identify purpose of each anticipated trip, destination, number of persons traveling, length of stay and all travel costs, including airfare (basis for rate used), per diem, lodging and misc. travel expenses. For local travel, include mileage and rate of compensation.

None expected.

Equipment

The City proposes to purchase and install 42 Badger electromagnetic flow meters with AMI end points for all meters 6” and larger. Engineering estimates using past bids are represented below:

Equipment			
Major Category	Unit Price	Quantity	Purpose
6" Badger Electromagnetic meter	\$6,500.00	25	Meter/Installation
8" Badger Electromagnetic meter	\$8,900.00	14	Meter/Installation
10" Badger Electromagnetic meter	\$9,500.00	1	Meter/Installation
12" Badger Electromagnetic meter	\$11,500.00	2	Meter/Installation
Total	\$5,303,134.92		

Materials and Supplies

Itemize supplies by major category, unit price, quantity and purpose, such as whether the items are needed for office use, research or construction. Identify how these costs were estimated (i.e., quotes, engineering estimates or other methodology). If the materials/supplies will be furnished and installed under a contract, the equipment should be included in the construction contract cost estimate.

The City proposes to purchase and install 11,193 Badger E-series AMI meters and end points. Engineering estimates using past bids are represented below:

Materials and Supplies			
Major Category	Unit Price	Quantity	Purpose
3/4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$236.34	8879	Meter/Installation
1" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$354.51	1045	Meter/Installation
1.5" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$531.77	646	Meter/Installation
2" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$797.65	474	Meter/Installation
3" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$1,196.47	69	Meter/Installation
4" E35 SS x 9" Fire Series Meter, Twist Tight 10' lead	\$1,794.71	38	Meter/Installation
LTE-M Cellular Endpoint, Twist Tight	\$134.17	11193	Meter Communications
Annual Service Units	\$10.68	11193	Meter Communications
13.25WAT Composite Lid, Center Drilled 2" Hole	\$26.00	9924	New meter pit lid for endpoint
24WAT Composite Lid, Center Drilled 2" Hole	\$65.00	1269	Meter Communications
Total	\$5,303,134.92		

Contractual

Identify all work that will be accomplished by consultants or contractors, including a breakdown of all tasks to be completed, and a detailed budget estimate of time, rates, supplies and materials that will be required for each task. For each proposed contract, identify the procurement method that will be used to select the consultant or contractor and the basis for selection.

The City will negotiate a contract with a specialized meter installation contractor for installation services, project setup and initiation, and software integration. The City plans to conduct a competitive bid for all AMI installation services with selection based on lowest bid prices and is a responsive bid (the contractor must meet the minimum qualifications for installation experience to bid on the project). The noted services by UMS is only utilized for developing a total project budget.

AMI Installation Contractor/Construction				
Meter Install Contractor: installation services	11,193	Project	Lump Sum	\$1,656,528.91
Meter Install Contractor: project setup, initiation & bonding (if required)	1	Project	Lump Sum	\$149,448.43
Meter Install Contractor: software integration	1	Project	Lump Sum	\$98,002.58

The City will negotiate a contract for all meter equipment, cellular endpoints, one year of cellular service for the meters, and new meter vault lids. The City will source this equipment to be consistent with existing meter replacement and consistency throughout the system.

Third-party In-kind Contributions

Identify all work that will be accomplished by third-party contributors, including a breakdown of all tasks to be completed, and a detailed budget estimate of time, rates, supplies and materials that will be required for each task.

Not applicable.

Environmental and Regulatory Compliance Costs

The AMI Project (meter installation) will occur underground in yards or parking lots of Greeley water customers, all within the City limits. No other earth-disturbing activities will occur that could negatively impact soil, air, water or animal habitat in the project area. Greeley will pursue a notice of exemption from environmental permit requirements, with an associated cost of \$250.00

Other Expenses

Any other expenses not included in the above categories shall be listed in this category, along with a description of the item and why it is necessary. No profit or fee will be allowed.

None.

Indirect Costs

No other indirect costs are anticipated.

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

1. Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

All AMI meter replacements will occur in an urban setting, typically at the meter pit which is located by the curb in the customer's yards or parking lots. Activities would include removing approximately 1 square foot or less of landscaping, per meter pit, with hand tools. There would be no impacts to air, water, or wildlife habitat as a result of these activities.

2. Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

As mentioned above, there are eight endangered species and ten migratory birds that are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act within the Greeley area. All AMI meter replacements will occur in an urban setting, typically at the meter pit which is located by the curb in the customer's yards or parking lots. Activities would include removing approximately 1 square foot or less of landscaping, per meter pit, with hand tools. There would be no impacts to air, water, or wildlife habitat as a result of these activities.

3. Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

Running a desktop analysis of the National Wetlands Inventory for the whole City of Greeley, there is potentially Waters of the United States. However as mentioned above, all AMI meter replacements will occur in an urban setting, typically at the meter pit which is located by the curb in the customer's yards or parking lots. There would be no impact to the Water of the United States.

4. When was the water delivery system constructed?

Greeley treats water at one of two treatment plants—Bellvue and Boyd Lake water treatment plants. The Bellvue plant, located northwest of Fort Collins, was built in the early 1900s. Water is conveyed to the plant from the Poudre and Laramie River through the Laramie-Poudre tunnel into the Poudre River. Treated water is piped 36 miles through three transmission lines to Greeley. This is Greeley's main treatment plant and operates 365 days a year.

The Boyd Lake plant, located west of Greeley in Loveland, treats Colorado River and Big Thompson River water through the C-BT project. Boyd Lake is a peaking plant (limited seasonal operation) and generally is operated from April through the end of October. Water is then pumped through 17 miles of transmission lines to Greeley. Within the City, Greeley operates and maintains three treated water storage facilities and approximately 600 miles of distribution lines and associated meters and fire hydrants.

5. Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No. This project is focused at the meter pits only.

6. **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.**
No. This project will occur at the curb in the customer's yards or parking lots.
7. **Are there any known archeological sites in the proposed project area?**
No. This project will occur at the curb in the customer's yards or parking lots.
8. **Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?**
No. In fact, this AMI meter replacement project will provide all populations with the same meter type and customers will have equal access to their personal water consumption data.
9. **Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?**
No. This project will be occurring within the City limits of Greeley or within the right-of-ways.
10. **Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?**
No. Landscape disturbance will be minimal and would occur within the customers' normal landscape like grass and ornamental plants.

REQUIRED PERMITS OR APPROVALS

Applicant must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

No federal, state, tribal, or county permits are required for this project. Staff anticipates they will need to secure right-of-way permits to access water meters when they are located within various non-City (Windsor, Fort Collins, Timnath, etc.) rights-of-way throughout the water service areas.