



Mandan Advanced Metering Infrastructure (AMI) System Update Project
City of Mandan, North Dakota

Project Proposal for Bureau of Reclamation Funding Announcement

Funding Opportunity Title
WaterSMART Small-Scale Water Efficiency Projects

Funding Opportunity Number
No. R24AS00052

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1.0 TECHNICAL PROPOSAL AND EVALUATION CRITERIA

The Technical Proposal is comprised of the following sections:

- 1.1 Executive Summary
- 1.2 Project Location
- 1.3 Project Description and Milestones
- 1.4 Evaluation Criteria

The mandatory federal forms (SF424 family) were included prior to the title page of this proposal.

1.1 Executive Summary

Date: July 8, 2024

Applicant Name: City of Mandan

City: Mandan

County: Morton County

State: North Dakota

Applicant Category: Category A

The City of Mandan, located in central North Dakota, has an aging Automated Metering Infrastructure (AMI) system in need of infrastructure upgrades to better track the City's water usage. There are 3,820 Invensys bronze water meters that are currently being operated in the City of Mandan's water meter network that need to be upgraded due to the following reasons that have been identified by public works staff:

- Improved Measuring Accuracy: The existing bronze meters are beginning to present inaccurate water usage readings.
- Leak Detection/Data Analytics: The existing bronze meters do not have the ability to alert municipalities and consumers of water leaks which prevents the City of Mandan from making informed decisions about their water management.

As part of the Mandan AMI System Update Project, the city will be replacing a portion of these aging meters. Upgrading to new meter technology improves the overall AMI functionality improving control over water loss and theft, and providing more efficient identification of and response to water leaks and usage spikes. It will also provide their customers with access to real-time water usage data through an online portal, allowing for enhanced customer water accounting and conservation. Ultimately, this project will help the City of Mandan conserve and better manage its water supplies and more efficiently provide water services to their customers. The City hopes to partner with the Bureau of Reclamation through the WaterSMART Grants: Small-Scale Water Efficiency Projects by applying for federal financial aid for the purchasing of water meter for Phase I of the Mandan AMI System Update Project. The anticipated start and completion dates for this project are April 1, 2025 and December 15, 2025, respectively. This project is not located on a Federal facility.

1.2 Project Location

The project is in the City of Mandan (City), located in Morton County, North Dakota. The City is located along the I-94 corridor, approximately 154 miles east of the North Dakota – Montana border, 61 miles north of the North Dakota - South Dakota border, and 151 miles south of the North Dakota – Canada border. The coordinates for the project are 46°49'31.50" N (latitude) and 100°53'30.37" W (longitude). A location map for the City of Mandan showing the City's water distribution system is provided as **Figure 1**.

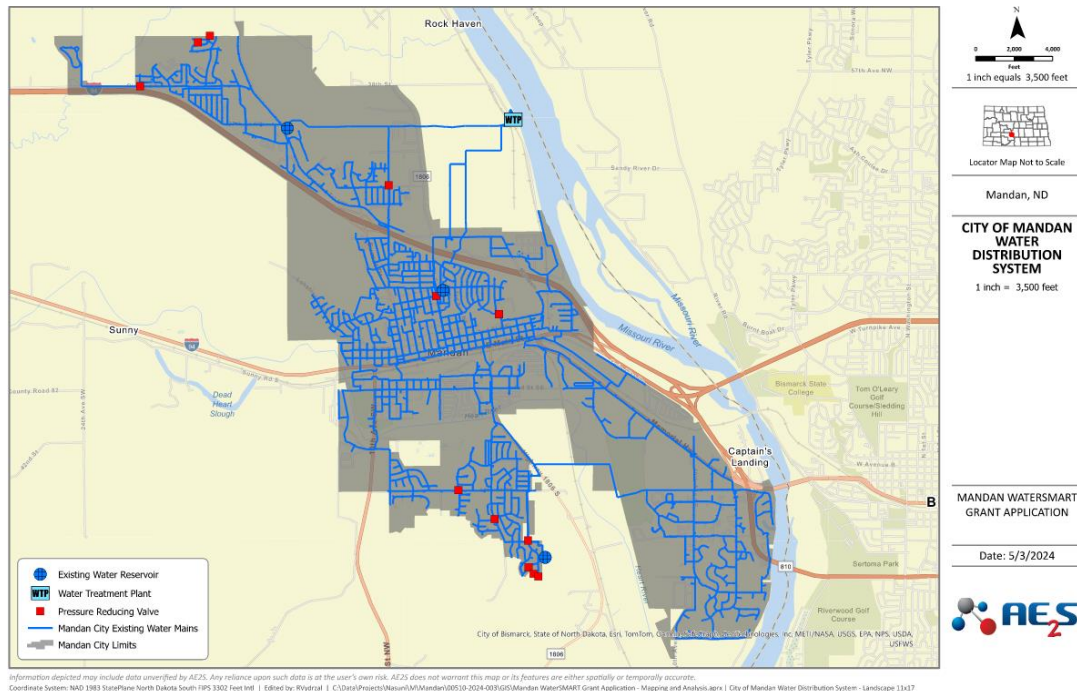


Figure 1. City of Mandan Location Map Showing Their Water Distribution System

1.3 Technical Project Description

As of the 2020 census, the City of Mandan provides water service to approximately 24,206¹ residents across a service area that encompasses approximately 8,800 acres. In recent years, the City has noticed increasing fluctuations and discrepancies between water production and customer water meter data. Additionally, the City has reached or is rapidly approaching the estimated useful life on the majority of the City's employed water meters.. As a result, the City is embarking on Phase I of an Advanced Metering Infrastructure (AMI) System Update Project to ensure the City continually provides reliable and accurate water delivery services for years to come. The City currently has Invensys SR-II meters employed throughout the city, and they are planning to purchase Sensus iPERL meters to replace the outdated meters.

This project, the Mandan Advanced Metering Infrastructure (AMI) Update Project – Phase I, includes purchasing and installing 615 upgraded water meters, and the City is requesting aid for the purchasing of those water meters. The replacement of the bronze water meters that are

nearing the end of their useful life will bring the City’s water metering network back to a fully functioning AMI system with enhanced abilities to communicate water usage data to their customers and read live data in a more profound footprint of the City. Upon project completion, the City and its customers will have access to water meter readings in real-time, eliminating manual meter readings and improving control over water loss and theft, efficiency of the identification and response to water leaks and usage spikes, and customer awareness of individual water use. The City expects to experience environmental, economic, and social benefits through enhanced and more efficient water delivery and monitoring efforts upon project completion. The project will commence in April 2025 once the funding becomes available and be completed in December 2025.

1.3.1 Background Data

The City utilizes water from the Missouri River as its water supply source. The Mandan Water Treatment Plant (MWTP) was established in 1911 along the banks of the Missouri River. From 1928 to 2000, the WTP underwent a number of expansion and upgrade projects to meet the growing municipal and industrial demands as the population grew and the oil and coal industries developed in the area. Additionally, in 1992, the Mandan City Commission approved the City to sell water to the Missouri West Rural Water System (MWRWS) beginning in 1993. The most recent major improvement was a new raw water intake completed in 2023. The new intake gravity feeds Missouri River water to the MWTP. Given the large amount of money spent on the new intake, it is critical that the City of Mandan monitors this water to make sure water use is being optimized, which is why this project is very important. The Mandan WTP has 132.3 miles of water mains and serves an area of 13.7 sq. mi. The MWTP treats and supplies its own water and does not use a wholesale provider or piggyback off another treatment plant for supplies. MWTP currently bills its customers a base charge plus a usage rate. **Table 1** and **Table 2** detail the charges and rates for different customer classes of MWTP.

ⁱUnited States Census Bureau. [Mandan city, North Dakota - Census Bureau Profile](#)

Table 1 – Mandan Water Treatment Plant Customer Base Charges Per Meter Hookups

Customer Class	Base Charge Per Meter Hookup
Single Family Dwelling	\$32.05
Mobile Home	\$32.05
Duplex Unit	\$64.10
Other Multifamily Units	\$96.15
Commercial and Industrial	\$64.10
Commercial/Apartment Complexes	\$96.15
Montana-Dakota Utilities Co	\$681.58

Table 2 – Mandan Water Treatment Plant Customer Usage Rates

Customer Class	Usage Rate
Mandan Water Customer	\$3.00 / HCF*
MWRWS Customers	\$1.96 / 1,000 gallons

Montana-Dakota Utilities Co	\$2.81 / HCF
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*Hundred cubic feet (HCF)

The City of Mandan is located in the Missouri River Basin, a region that has historically been stricken with catastrophic flooding and periods of drought. With the changing climatic conditions of the area, the City of Mandan has become increasingly aware of the importance of creating and securing an element of climate resiliency within their WTP. This project will improve the water management and resource control of MWTP and its customers, ensuring more efficient and reliable water availability and delivery during times of drought.

Due to the City’s distribution system infrastructure approaching the end of its useful life, the City recently identified some inefficiencies in its water monitoring and water delivery processes. The City has prioritized enhancing their water meters as an initial step to improving their water system infrastructure, as well as their water delivery processes.

1.3.1.1 Project Description

In 2025, the City intends to conduct Phase I of their AMI Systems Update Project, which includes replacing 615 water meters. This project will be the first step in updating the City’s existing automated system. The City is planning to purchase Sensus iPERL meters. This infrastructure allows for real-time data acquisition and viewing through an online portal that is visible to both the utility and the customers. Upgrading outdated meters nearing the end of their useful life will improve metering accuracies, provide customers access to real-time water usage data, and aid further reduction of the City’s non-revenue water (NRW) amount by tracking water losses, theft, and usage spikes. **Table 3** lists the project plan for 2025.

Table 3 – Mandan AMI System Update Project Plan for 2024

Phase No.	Year	Description of Improvements
Phase I	2025	<ul style="list-style-type: none"> - Apply for a CATEX File Through the USEPA - Procure Water Meters - Install 615 Water Meter Replacements

1.3.1.2 Water System Composition

The City of Mandan’s water distribution system is comprised of approximately 132 miles of water main piping and approximately 7,761 curbstop valves ranging in pipe diameter, pipe material, and install date. The system also has 12 pressure reducing valves and 3 water reservoirs (2-, 3-, and 4-million gallons, respectively) used to maintain storage levels and distribution system pressures as well as supply fire protection and peak demand period water. The City has 7,761 customer water meters located throughout the City. The MWTP distribution system can produce up to 12 million gallons per day (MGD); however, on average, the plant produces 2.8 MGD and 7 MGD on peak summer days.

In 2014, the City conducted a partial meter replacement project, but 3,820 meters still need to be upgraded. The meters employed by the City that are approaching the end of their useful life are Invensys meters. These meters have limitations in reading per minute and providing real-time data. The Invensys bronze meters rely on mechanical components that are designed to measure cumulative water usage over longer periods rather than providing high-resolution, instantaneous flow rates. The mechanical parts have certain response times and inertia, which makes them less suitable for capturing rapid changes in water flow that would be necessary for per-minute readings. The public works department has noticed that the mechanical system is not reacting quickly enough to small, transient flow changes. The only way the City can currently identify a large leak with the aged meters at a residents home is when the resident gets a utility bill and sees their water use is high enough to justify there is a leak. The upgraded meters will have the same capabilities as the meters throughout the city that were updated in the 2014 meter replacement project. This project will bring more customers live data and improve the City/customer interface.

1.3.1.3 Water Use

Mandan’s produced water annual totals, billed water annual totals, and non-revenue water annual totals from years 2017 to 2022 are provided in **Table 4**. Also included in the table is Mandan’s annual non-revenue water percentages for each of the seven-years assessed. Additionally, the seven-year averages for each respective column are included at the bottom of the table.

Table 4 – Total Annual Water Purchased, Water Billed, and Non-Revenue Water for Mandan from years 2017 to 2023

Year	Total Water Produced (AC FT)	Total Water Billed (AC FT)	Non Revenue Water (AC FT)	Non Revenue Water Percentage
2017	3,424	3,104	320	10.3
2018	3,223	2,963	259	9.7
2019	2,970	2,647	323	12.2
2020	3,607	3,290	317	9.6
2021	3,817	3,471	347	10.0
2022	3,414	3,106	308	9.9
2023	3,265	2,961	305	10.3
Average	3,389	3,077	311	10.3

The City’s average non-revenue water amount from 2017 to 2023 was 311 AC-FT/YR (this value is used in calculations going forward). It is also evident from **Table 4** that the amount of non-

revenue water has been steadily around 10% of produced water for the past 7 years, indicating that there are consistent errors or leaks occurring throughout the Mandan distribution system in its current state.

According to the City's customer billing records, approximately 76.5% of water is billed to residential customer accounts. The remaining 23.5% of water is billed to commercial and other accounts. Using the seven-year average total water billed amount of 3,077 AC-FT/YR, the following were calculated:

- Typical Annual Residential Use
 - o 2,354 AC-FT/YR (76.5% of billed usage)
- Typical Annual Commercial and Other
 - o 723 AC-FT/YR (23.5% of billed usage)

Of the City's total 7,761 meters, 6,710 are residential customer accounts. As a result, it is estimated that each residential customer account utilizes 0.35 AC-FT (typical annual residential usage of 2,354 AC-FT/YR divided by 6,710 residential accounts) of water per year.

1.3.2 Problems and Project Need

This section outlines the need for the project, which includes the following four sections: distribution system losses, residential losses, aging meter endpoints, and affordability challenges.

1.3.2.1 Distribution System Losses

Over the past 7 years, 10.3% or 311 **AC-FT/YR** (as shown in **Table 4 4**) of produced water is being lost on average. These losses are occurring in the Mandan distribution system (somewhere between the treatment plant meters and the customer meters) through either: (1) apparent losses, such as unauthorized consumption and customer meter inaccuracies or (2) real losses through infrastructure systems including water main, storage, and service connection leaks. The City consistently monitors non-revenue water and actively strives to keep this number low.

1.3.2.2 Residential Losses

A study conducted by the Environmental Protection Agency (EPA) states that average water loss through a residential home (i.e. leaky appliances, plumbing issues, etc.) is 13.7% of total water use. Based on this value, it is estimated that each of Mandan's single-family residences lose 0.04 AC-FT/YR (13.7%x 0.26 AC-FT/YR) through residential plumbing leaks, recognizing that some of the older homes may lose more water and some of the newer homes may lose less water. Based on this calculation, the total estimated average residential losses experienced in Mandan is **268 AC-FT/YR** (0.04 AC-FT/YR x 6,710 single-family residential meters).

The total estimated water loss through distribution system losses and residential losses is **579 AC-FT/YR** (311 AC-FT/YR + 268 AC-FT/YR), or approximately **516,863 gallons per day**. With improved meter reading accuracy through updated water meters, these losses can be isolated and mitigated.

1.3.2.3 *Aging Meter Endpoints*

As mentioned previously, the City's water meters are reaching the end of their useful life and are anticipated to die in the near-future. For this reason, the project is a priority of the City's to ensure that water services and water service billings are provided in an efficient, accurate, and uninterrupted manner.

1.4 Evaluation Criteria

The answers to the evaluation criteria are provided in [blue](#).

E.1.4.1 Evaluation Criterion A---Project Benefits

- Describe the expected benefits and outcomes of implementing the proposed project
 - o Explain the anticipated water management benefits of the water supply delivery system and water customers.
 - Will the project result in more efficient management of the water supply?

[This project will replace aging water metering infrastructure throughout the City and will help the City update and replace their current Advanced Metering Infrastructure \(AMI\) system. It is anticipated that this project will lower and stabilize the amount of water the City loses in both distribution system losses and residential losses through updated AMI. The updated AMI system will help MWTP staff identify and respond to water usage spikes caused by leaks and watermain breaks within the distribution system, improve the efficiency and accuracy of the City's water meter readings and customer billings, and will help customers track and conserve water through access to their own real-time usage data.](#)

[On average, from 2017 to 2023, the City had a non-revenue water percentage of 10.3%, which equates to 311 AC-FT/YR or 371 HCF per day in distribution system losses. The City bills water to their City of Mandan customers at a rate of \\$3.00 per HCF; therefore, the City loses approximately \\$1,113.00 per day in non-revenue water \(\\$406,245.00 per year\). Note, this water usage rate varies for MWRWS and Montana-Dakota Utilities Co customers \(refer to \[Table 2\]\(#\)\).](#)

[It is anticipated that Mandan will reduce water losses through implementation of this project. The money saved from operating an upgraded AMI distribution system could be used towards other critical water infrastructure improvements as well as alleviating the burden of significant water rate increases to ensure the City continues to provide affordable and equitable water service.](#)

- [Where any of the conserved water as a result of the project will go and how it will be used?](#)

The conserved water resulting from curbing water losses through this project will simply be additional water supply available to Mandan’s customers; thereby, improving the water security and resiliency of the City.

- Explain the significance of the anticipated water management benefits of the water delivery system and water customers. Consider the following:
 - Are customers not currently getting their full water rights at certain times of year?
Customers are currently getting their full water rights.
 - Does this project have the potential to prevent lawsuits or water calls?
This project will update the City’s AMI system and replace dead and dying meters , allowing both the City and its customers a renewed capacity to see real-time water usage using the newly installed water meters. This will result in fewer water billing disputes and water calls.
 - What are the consequences of not making the improvement?
If this project is not completed, the large volume of water loss due to aging meters will continue as well as the existing meters and are expected to start dying, which would hinder the City’s ability to read meters and appropriately bill customers. This would directly cause the City’s non-revenue water amount to increase.
 - Are customer water restrictions currently required?
There are currently no water restrictions and no water restrictions are forecasted. Nevertheless, 2021 was an exceptionally dry year where much of the state experienced drought, leading some municipalities in the state to employ restrictions on outdoor lawn watering to minimize the drought’s negative impacts.
 - Other significant concerns that support the need for the project.
This project will reduce the amount of miles driven to address aged water meters and also reduce the labor and drive time to track down a leak, in turn, reducing carbon emissions, fuel costs, and wear on the City’s pavement system. It will also free-up time currently spent by City staff identifying leaks shown on water bills, as opposed to alerting in real time data, to focus on other needs of the water system.
- Describe the broader benefits that are expected to occur as a result of the project. Consider the following:
 - Will the project improve broader water supply reliability at sub-basin or basin scale?

- Extent to which the proposed project will increase collaboration and information sharing among water managers in the region

This project will provide the City and its customers access to real-time water usage data. Since the City of Mandan not only supplies water to city residents but also MWRWS and Montana-Dakota Utilities Co, this project will also aid in better water management and budgeting for these providers as well. Additionally, Mandan’s water is sourced from the Missouri River, which is an essential water source for many other communities downstream of Mandan. The improved management of Mandan’s authorized discharge will better safeguard water supplies for downstream users.

On a separate note, this data could be shared across the state, basin, and region for incorporation in various state and regional studies and benchmarking efforts.

- Is the project in an area that is experiencing, or recently experienced, drought or water scarcity? Will the project help address drought conditions at the sub-basin or basin scale?

North Dakota experienced one of its worst droughts of the last century in 2021. By updating the City of Mandan’s current AMI metering system, the current non-revenue water losses will be curbed, conserving that lost water volume for essential uses during times of water shortage and drought. This conservation for essential use will more efficiently utilize available water resources and lessen the impacts of water shortages during drought. Additionally, the advanced utility metering could be used to inform water use restriction enforcement efforts, if needed, during future water shortages or droughts.

- Will the project benefit any federally threatened or endangered, federally recognized candidate species, a state listed species, or species of particular recreational or economic importance?

Not applicable.

- Any anticipated positive impacts/benefits to local sectors and economies within the applicable geographic area (e.g., agriculture, environment, recreation, tourism)

Utilizing AMI will reduce the amount of water that is lost throughout the City’s water distribution system. Anticipated environmental benefits of curbing water losses include reductions in both the chemicals used for

water treatment and production and the energy consumption for water treatment and pumping. Another environmental benefit of an updated AMI system is that the customers will have access to their real-time usage data, allowing them to practice conservation efforts, saving water and money.

One anticipated economic impact of this project is money savings to city recreation as the City parks will also be able to see real-time data, allowing them to isolate and repair problem areas. Finally, utilizing the AMI system's data to inform future rate modeling and water utility fund budgeting, would allow the City of Mandan to delay the need for water rate increases though more accurate resource planning; thereby, providing economic benefits to their customers and the City in its entirety.

- Extent to which the project will complement work done in coordination with NRCS in the area (e.g., with a direct connection to the district's water supply).

Not applicable.

E.1.4.2. Evaluation Criterion B---Planning Efforts Supporting the Project

- Describe how your project is supported by an existing planning effort.
 - Is the project identified specifically in an existing planning effort? If so, describe when the existing plan was developed and what its purpose and/or objective was. North Dakota established a "Water Development Plan" in 2023, which outlines the state's water development goals and priorities through 2025. One of the highlighted goals is to improve the resiliency and reliability of water supplies to North Dakota citizens for their health and prosperity as well as that of the state's economy. Additionally, it was highlighted throughout this plan that general water and water supply projects are considered a priority, and it specifies projects that improve upon or replace water distribution infrastructure under this priority category.
 - Does the proposed project implement a goal or address a need or problem identified in the existing planning effort?
The Mandan AMI System Update Project – Phase I will upgrade water meters for the City of Mandan, enabling improved water delivery through more transparent and reliable water accounting and billing as well as a more resilient distribution system through decreased nonrevenue volumes. This project aligns with the aforementioned goals of the State of North Dakota.
- Explain how the proposed project has been determined as a priority in the existing planning effort as opposed to other potential projects/measures.

Through ongoing planning efforts and identifying that the City’s water metering infrastructure is reaching the end of its useful life, the City has determined that updating and replacing the aging infrastructure is a top priority. In 2014, the City completed a meter upgrade project that covered part of their service area; however, 3,820 meters throughout their distribution system still require replacement. Failure to address these remaining meters through this project will lead to data loss, less transparent customer billing, and an increase in water calls and nonrevenue water. This project aims to build upon the previously planned and conducted system improvements project implemented by the City back in 2014.

E.1.4.3. Evaluation Criterion C---Project Implementation and Results

- Describe the implementation plan for the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

The Mandan AMI System Update Project – Phase I will be started in April of 2025 (anticipated to start as soon as grant award becomes available) and be completed in December of 2025. The proposed project schedule is outlined below in [Table 5](#), noting that the city will need to apply for a CATEX file prior to the kickoff of the project in April. The City is intending to contract Core & Main to complete the installation of the water meter infrastructure for this Project.

Table 5 – Proposed Project Schedule

Approximate Date	Major Tasks
February	Apply for CATEX File
April – June	Procure Water Meters
July	Install 200 Water Meters
August	Install 200 Water Meters
December	Install 215 Water Meters

If the City of Mandan is successful in receiving grant funding, the City will work cooperatively with the Bureau of Reclamation to meet specific milestones and adhere to schedule requirements set forth by the Bureau of Reclamation.

- Describe any permits and agency approvals that will be required, along with the process and timeframe for obtaining such permits or approvals.
Because the water meters will be installed in homes and businesses, no permits will be required for this project. Customers will be notified prior to installation of the water meter.

- Identify and describe any engineering or design work performed specifically in support of the proposed project.
[No engineering or design work is anticipated for this project.](#)
- Describe any new policies or administrative actions required to implement the project.
[Public outreach efforts are planned prior to project implementation to inform customers of the water meter installation and the updated real-time water usage viewing capabilities that will be offered.](#)
- Describe the timeline for gaining access to the land or water source where the project is located. Have any required easements been obtained?
[Not applicable.](#)
- Describe the timeline for completion of environmental and cultural resource compliance.
[No environmental and cultural resource compliance is anticipated for this project; however, an application will be submitted in February of 2025 to obtain a CATEX file through the EPA prior to the start of the project to prove all environmental and cultural resource compliance is being met.](#)
- Was the timeline for completion of environmental and cultural resource compliance discussed with the local Reclamation office?
[Not applicable.](#)

E.1.4.4. Evaluation Criterion D---Nexus to Reclamation

- Is the proposed project connected to a reclamation project or activity?
[No, this project is not connected to another Bureau of Reclamation Project.](#)
- If so, how? Please consider the following:
 - Does the applicant have a water service, repayment, or operations and maintenance contract with Reclamation?
[No.](#)
 - Does the applicant receive Reclamation project water?
[No.](#)
 - Is the project on Reclamation project lands or involving Reclamation facilities?
[No.](#)
 - Is the project in the same basin as a Reclamation project or activity?
[There is an ongoing project connected to the Bureau of Reclamation going on in the State of North Dakota that would potentially provide water supply from the Missouri River to serve central and eastern North Dakota. According to the Bureau of Reclamation website, the Bureau of Reclamation signed a record decision on January 15, 2021, selecting the preferred alternative proposed for the Eastern North Dakota Alternate Water Supply \(ENDAWS\) Project. The selected alternative includes construction of infrastructure to provide up to 165 cubic-feet-per-second of water from the McClusky Canal. Water will be delivered through a buried](#)

pipeline along a northern route and connect with the main transmission pipeline of the state-led Red River Valley Water Supply Project (RRVWSP). Both ENDAWS and the RRVWSP are located in North Dakota (Bureau of Reclamation Region 5).

- Will the proposed work benefit a Reclamation project area or activity?
No.
- Will the proposed work contribute water to a basin where a Reclamation project is located?
No.

E.1.4.5. Evaluation Criterion E---Presidential and Department of the Interior Priorities

Without repeating benefits already described in previous criteria, describe in detail how the proposed project supports a priority(ies) below.

E.1.5.1. Sub-criterion No. E1. Climate Change

- Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.
- Using the “Climate Mapping for Resilience and Adaptation” (v1.3.1) Tool, the specific climate hazards for the City of Mandan were investigated. Essentially, storms will become more intense and less frequent leading to more severe periods of drought and flashier influxes of water that are more sporadic. The annual number of days with maximum temperatures over 90°F, 95°F, 100°F, and 105°F are all increasing through the century as well as the highest annual single-recorded and 5-day average maximum temperatures. Consequently, cooling-degree days are expected to significantly increase, leading to higher water demands for cooling and air-conditioning purposes.

Additionally, the pairing of increased temperatures with a decrease in annual “wet days” brings along expectations of more frequent and more severe drought periods and fire hazards as well as potential drops in water supply as they rely on Missouri River flows which are dependent upon regional precipitation. This is evidenced by North Dakota experiencing one of their worst droughts of the past century in 2021. Water utility resiliency and reliability is quintessential looking to the future so that in times of drought or emergency they can provide for these additional needs such as firefighting, landscape watering, etc.

This project will improve the City’s water accounting ability to track water use and more efficiently identify and fix leaks throughout their distribution system. As a result, reductions in the high nonrevenue water volumes currently being seen by the utility are expected. With the improved customer interface ensuing this project, water users will

be able to more efficiently track their water budget and better practice water conservation efforts.

These outcomes of the project for the City and water utility will actively work towards adapting to the changing climate and the areas specific hazards. It will ultimately lead to a more resilient water utility that uses its water resources in a more economically and environmentally friendly manner, allowing for reliable, adequate, and quality water delivery to its users, even in times of drought or emergency. Secondly, the better-informed water users that can budget and account their own water use through an improved customer-facing interface will be able to assist the water utility in water conservation efforts to minimize water waste and nonrevenue water volumes.

- Does this proposed project strengthen water supply sustainability to increase resilience to climate change? Does the proposed project contribute to climate change resiliency in other ways not described above?
 - o The curbing of distribution system and domestic water losses and nonrevenue water will directly impact the amount of water needing to be treated by the utility, decreasing their use of fossil fuels and ultimately their carbon emissions. All the climate hazards mentioned above are exacerbated by increased emissions, and, while the decrease of Mandan’s water utility emissions will not halt or reverse global trends, it shows that they are taking responsibility and doing their part to address and adapt to climate change.

E.1.5.2. Sub-criterion No. E2. Disadvantaged or Underserved Communities

- Will the proposed project serve or benefit a disadvantaged or historically underserved community? Benefits can include, but are not limited to, public health and safety by addressing water quality, new water supplies, or economic growth opportunities.
 - o The project will provide real-time access to water usage information updated water meters are being installed. This will result in real-time information transfers that will allow customers to curb and limit water usage spikes, which would in turn lower water bills.
 - o This project will also decrease the NRW losses that the utility is experiencing. This additional water supply and saved production expenses could be used to expand the utilities services to new developments or more rural areas not currently being served.
- Please use the White House Council on Environmental Quality’s interactive Climate and Economic Justice Screening Tool, available online at Explore the map – Climate & Economic Justice Screening Tool (<https://screeningtool.geoplatform.gov>) to identify any disadvantaged communities that will benefit from your project.
 - o No disadvantaged or underserved communities are located in the project area.

- 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.
 - o Not applicable.

E.1.5.3 Sub-criterion No. E.3. Tribal Benefits

- Does the proposed project directly serve and/or benefit a Tribe? Will the project improve water management for a Tribe?
The project is not located within tribal jurisdiction, and the MWTP does not serve a tribal community. Not applicable.
- Does the proposed project support Tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety by addressing water quality, new water supplies, or economic growth opportunities?
The project is not located within tribal jurisdiction. Not applicable.

1.5 Overlap of Duplication of Effort Statement

The only overlap that potentially exists between this project and other projects is when the City is forced to replace water meters or SmartPoints as they go dead, requiring immediate replacement.

This grant application, submitted for consideration under this program, does not in any way duplicate a proposal or project that has been or will be submitted for funding consideration to any other potential funding source. The City would like to continue to apply for future WaterSMART grant opportunities, as applicable and available, to continuously improve their water system.

2.0 PROJECT BUDGET

The proposed project budget is described in the forthcoming sections.

2.1 Funding Plan and Letters of Commitment

The funding plan for this project is to utilize money from the City of Mandan Water Utility Fund to fund the City's cost-share portion of the project. These funds are available and already programmed in the City's budget, so no time constraints exist on the available funds. The total estimated project costs (including federal and local cost shares) for this project are \$221,816.00. The City is requesting \$100,000 (45% of total project costs) in federal cost-share from the Bureau of Reclamation under this grant, with the remaining amount to be funded by the City of Mandan through their Water Utility Fund.

Included in the notice of funding opportunity were the following parameters, which are answered in [blue](#). Please identify the sources of the non-Federal cost-share contribution for the project, including:

- Any monetary contributions by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments)
[The City of Mandan will use budgeted funds from the City's Water Utility Fund to pay for the non-federal share of the Project costs.](#)
- Any costs that will be contributed by the applicant
[The City of Mandan is planning to contract Core & Main to install the water meters. The fees and costs associated with these activities are outlined in the budget proposal and budget narrative.](#)
- Any third-party in-kind costs (i.e., goods and services provided by a third party)
[No.](#)
- Any cash requested or received from other non-Federal entities
[No.](#)
- 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
[No.](#)

No project costs are anticipated prior to award. A summary of the total project costs is provided in

Table 6 –6. It should be noted that the City of Mandan is registered (and maintains an active registration) in the System for Award Management (SAM). The City is also registered with and

Table 6 – Total Project Costs

Source	Amount	Percentage
Costs to be reimbursed with the requested Federal funding	\$ 100,000.00	45%
Costs to be paid by applicant	\$ 123,706.25	55%
Value of third-party contributions	\$ 0.00	0%
TOTAL PROJECT COST	\$ 223,706.25	100%

2.2 Budget Proposal

The budget proposal for this project is provided below in **Table7**.

Table 7 – Budget Proposal

Budget Item Description	Computation		QTY Type	Total Cost
	\$ / Unit	QTY		
Salaries and Wages				
Fringe Benefits				
Travel				
Equipment				
Supplies and Materials				
3/4 iPERL 1G 25' 3W PE SM	\$ 263.76	615	EA	\$ 162,206.25
Contractual/Construction				
Installation of Meters	\$ 100.00	615	EA	\$ 61,500
Other				
TOTAL DIRECT COSTS				\$ 223,706.25
Indirect Costs				
TOTAL INDIRECT COSTS				\$ 0.00

2.3 Budget Narrative

The following categories were included in the notice of funding opportunity and provide the budget narrative for this project.

2.3.1 Salaries and Wages

The City's plan is to contract Core & Main to install the iPERL meters. The associated costs for these contracted services are discussed in **2.3.6 Contractual**. There are no salaries and wages associated with this project.

2.3.2 Fringe Benefits

The City's plan is to contract Core & Main to install the iPERL meters. The associated costs for these contracted services are discussed in **2.3.6 Contractual**. There are no salaries and wages associated with this project.

2.3.3 Travel

Travel is not eligible and will not be requested for reimbursement.

2.3.4 Equipment

Because the City plans to retain the meter supplier to conduct the installations, no City equipment is anticipated; therefore, no reimbursement is requested.

2.3.5 Materials and Supplies

Reimbursement is being requested for the procurement and installation of 615 iPERL meters. The costs for materials and supplies are provided in a quote from a nation-wide and local supplier, Core & Main, and is included as **Appendix A**. Also included in Appendix A are the data sheets for the respective infrastructure planned to be installed.

If the City of Mandan is selected for grant funding, the City would like to consider procuring the materials and supplies as soon as they are notified of the grant award (if allowed by the Bureau of Reclamation). Through discussions with various suppliers, the materials and supplies outlined in this grant application have long lead times due to post-pandemic labor and material shortages, foreign conflicts, growing inflation, supply chain issues, etc. Early procurement of the materials and supplies will help the City maintain the schedule outlined in the Project Implementation Plan and ensure accuracy of the supplied quote from Core & Main.

2.3.6 Contractual

The City's plan is to contract Core & Main to install the iPERL meters. According to the quote from Core & Main provided in [Appendix A](#), Core & Main charges an installation fee of \$100.00 per water meter unit installed. These installation fees are included in the budgeted costs ([Table 7](#)) for this project, and reimbursement is being requested.

2.3.7 Third-Party In-Kind Contributions

No third-party in-kind contributions are anticipated; therefore, no reimbursement is requested.

2.3.8 Environmental and Compliance Costs

No environmental and compliance costs are anticipated; therefore, no reimbursement for this is requested.

2.3.9 Indirect Costs

No indirect costs are anticipated; therefore, no reimbursement is requested.

3.0 ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

The following questions were provided in the notice of funding opportunity (NOFO), and answers to the questions are provided in [blue](#).

- 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.

[The impact to the surrounding environment will be negligible during the installation of the water meter replacements given they will be installed inside customer residences and businesses. The City of Mandan and contracted Core & Main staff will take all necessary precautions and steps to minimize negative effects towards soil, air, water, or animal habitat during installation of the water meters.](#)

- 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?

[Within Morton County \(county where Mandan is located\), there are 6 federally listed threatened or endangered species: black-footed ferret, northern long-eared bat, pallid sturgeon \(historic habitat\), piping plover, red knot \(possible habitat\), and whooping crane. Additionally, the monarch butterfly is a candidate species that migrates through Morton County, and the least tern is a species present in Morton County that was recently](#)

delisted. Although there are threatened or endangered species listed in the project area, none will be affected with the installation of the water meters because they will be installed within City residences and businesses.

- 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.

Yes, but the project will not impact any ‘Waters of the United States’ because the installation of the water meters will be installed inside City residences and businesses.

- When was the water delivery system constructed?

The Mandan Water Treatment Plant (MWTP) was originally constructed in 1911. There were multiple projects to upgrade and expand the Mandan distribution system between 1911 and 2000. The delivery system incorporates roughly 132 miles of pipe.

- 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.

- 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.

- Are there any known archeological sites in the proposed project area?

There are no known archeological sites in the proposed project area.

- Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

The project will have positive impacts on low income and minority populations because every property owner with a water meter will have access to an online portal that allows them to view their water usage in real-time. Having this information will allow customers to be more cognizant of their water use and allow them to catch water spikes caused by leaks or plumbing fixtures left on inadvertently.

- Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

No.

- 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.

4.0 REQUIRED PERMITS OR APPROVALS

No permits are required for this project. Property owners will be notified in advance prior to installation of the water meters.

5.0 LETTERS OF FUNDING COMMITMENT

The non-federal share for this project will be funded through the City of Mandan Water Utility Fund. Therefore, no letters of funding commitment were included.

6.0 LETTERS OF PROJECT SUPPORT

The project has the support of City staff. The project was presented to Mandan’s City Council at the May 6, 2024 Council meeting and has the support of the Council. The project has also been presented at a subcommittee level and has support of the subcommittee. The Official Resolution will be signed and adopted by the City Council at their next Council meeting.

7.0 OFFICIAL RESOLUTION

The Mandan City Council meets the first Monday of every month. At the time of preparing this application, the next scheduled City Council meeting is on Month Day, 2024.

The Official Resolution will be adopted at the Month Day City Council meeting and submitted to the Bureau of Reclamation at sha-dro-fafoa@usbr.gov within the 30-day allotted time window following the July 9, 2024 application deadline.



APPENDIX A – MATERIALS AND SUPPLIES – DATA SHEETS AND COST PROPOSALS

SR II® WATER METERS



DISPLACEMENT TYPE MAGNETIC DRIVE COLD WATER METERS 5/8" (DN 15mm), 3/4" (DN 20mm) and 1" (DN 25mm)

DESCRIPTION

APPLICATIONS: Measurement of cold water where flow is in one direction only; in residential, commercial and industrial services.

CONFORMANCE TO STANDARDS: Invensys SR II Water Meters comply with ANSI/AWWA Standard C700-latest revision. Each meter is tested to insure compliance.

CONSTRUCTION: Invensys SR II Water Meters consist of three basic components: maincase; measuring chamber; and sealed register. Maincases are of bronze with externally-threaded spuds. Registers are housed in a bronze bonnet, a bonnet of synthetic polymer is available as an option. Measuring chambers are of Rocksyn® a corrosion-resistant, tailored thermoplastic material formulated for long-term performance and especially suitable for aggressive water conditions. Maincase bottom plates are available in bronze or, if frost protection is desired, in cast iron or synthetic polymer①.

REGISTER: Hermetically sealed; proven magnetic drive design eliminates dirt and moisture contamination, tampering and lens fogging problems. Standard register includes a straight-reading, odometer-type totalization display; a 360° test circle with center sweep hand; and a low flow (leak) detector. Gears are self-lubricating, molded plastic for long life and minimum friction.

No change gears are required for accuracy calibration. Encoder-type remote reading systems are available for all SR II Water Meters. (See other side of sheet for additional information.)

TAMPER RESISTANT FEATURE: A unique locking system prevents customer removal of the register to obtain free water. A special tool, available only to water utilities, is required to remove the register bonnet.

MAGNETIC DRIVE: The SR II features a hydrodynamically cushioned design that eliminates premature wear of components. The meter utilizes a patented positive, reliable drive coupling. The high-strength magnets used will eliminate "drive slip" in normal use and also provide adequate strength to drive remote register units.

OPERATION: Water flows through the meter's strainer and into the measuring chamber where it drives the piston. The hydrodynamically balanced piston oscillates around a central hub, guided by the division plate.

A drive magnet transmits the motion of the piston to a driven magnet located within the hermetically sealed register. The driven magnet is connected to the register gear train. It reduces the piston oscillations into volume totalization units displayed on the register dial face.

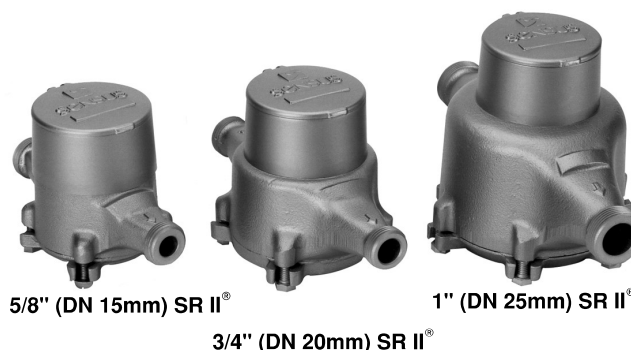
MAINTENANCE: Invensys SR II Water Meters are engineered to provide long-term value and virtually maintenance-free operation. Simplicity of design and precise machining of components allows interchangeability of parts of like-size meters, reduced parts inventory requirements, and ease of maintenance. The register can be removed without relieving the water pressure or removing the maincase from the installation.

As an alternative to utility repair, Invensys offers maintenance programs to provide factory reconditioning of the maincase and replacement components at low fixed prices. See bulletin PD-299.

CONNECTIONS: Tailpieces/Unions for installing the meters on a variety of pipe types and sizes are available.

GUARANTEE: Invensys SR II Water Meters are backed by "The Invensys Guarantee." Ask your Invensys representative for details or see Bulletin G-500.

SPECIFICATIONS



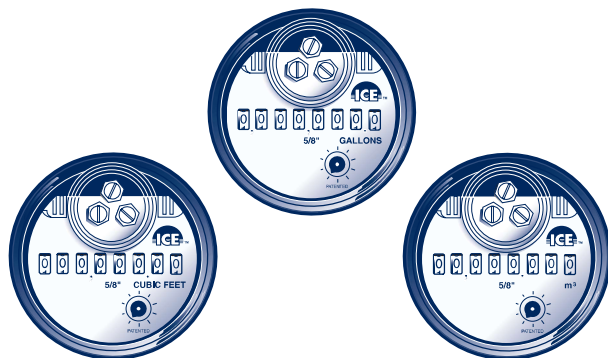
SERVICE	Measurement of cold water with flow in one direction only.
NORMAL OPERATING FLOW RANGE②	5/8" (DN 15mm) size: 1 to 20 gal/min. (0.25 to 4.5 m³/h) 3/4" (DN 20mm) size: 2 to 30 gal/min. (0.45 to 7.0 m³/h) 1" (DN 25mm) size: 3 to 50 gal/min. (0.7 to 11.0 m³/h)
ACCURACY	100% ± 1.5% of actual thruput
LOW FLOW REGISTRATION	5/8" size: 95% at 1/4 gal/min. (0.06 m³/h) 3/4" size: 95% at 1/2 gal/min. (0.10 m³/h) 1" size: 95% at 3/4 gal/min (0.15 m³/h)
MAXIMUM PRESSURE LOSS	5/8" size: 7.0 psi at 20 gal/min. (0.5 bar at 4.5 m³/h) 3/4" size: 9.0 psi at 30 gal/min. (0.6 bar at 7.0 m³/h) 1" size: 7.3 psi at 50 gal/min. (0.5 bar at 11.0 m³/h)
MAXIMUM OPERATING PRESSURE	150 psi (10.0 bar)
MEASUREMENT ELEMENT	Oscillating piston
REGISTER	Straight reading, hermetically sealed, magnetic drive. Remote reading unit optional.
REGISTRATION	10 gallons, 1 cubic foot, or 0.01 m³/ or 0.1 m³/sweep hand revolution. 10,000,000 gallons, 1,000,000 cubic feet or 100,000 m³ capacity. 6 odometer wheels.
METER CONNECTIONS③	5/8" (DN 15mm) size: 3/4" (26.44mm) threads 5/8" x 3/4" (DN 15mm x 33mm) size: 1" (33.25) threads 3/4" (DN 20mm) size: 1" (33.25 threads) 3/4" x 1" (DN 20mm x 42mm) size: 1-1/4" (41.91mm) threads 1" (DN 25mm) size: 1-1/4" (41.91mm) threads (All threads are straight pipe, external type, conforming to ANSI B1.20.1 or ISO R228, if specified.)
MATERIALS	Maincase—Bronze Register box—Bronze (standard), synthetic polymer (optional) Measuring chamber—Rocksyn® Bottom plate—Bronze, cast iron or synthetic polymer① Magnets—Plasticized material Casing bolts—Stainless steel Strainer—Synthetic polymer

① Synthetic polymer maincase bottom plate available on 5/8" meter only.

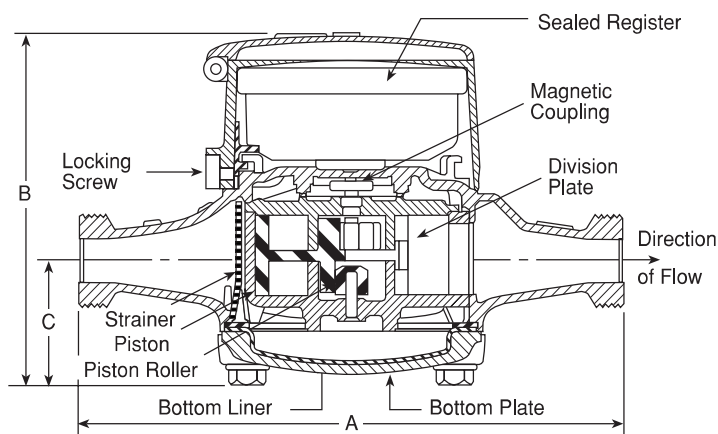
② Maximum rates listed are for intermittent flow only. Maximum continuous flow rates as specified by AWWA are: 5/8" (DN 15mm)—10 gal/min (2.3 m³/h), 3/4" (DN 20mm)—15 gal/min (3.4 m³/h) 1" (DN 25mm)—25 gal/min (5.7 m³/h)

③ Unless otherwise noted, 5/8" size and 5/8" x 3/4" characteristics are identical. (5/8" x 3/4" designates 5/8" with 3/4" connection thread.) Also unless otherwise noted 3/4" size and 3/4" x 1" size characteristics are identical. (3/4" x 1" designates 3/4" with 1" connection thread.)

Metric designation is the normal bore x the outside diameter.



5/8" (DN 15mm) Dials Shown



Dimensions and Net Weights

Meter Size	A	B	C	Width	Net Weight ^①
5/8" (DN 15mm)	7-1/2" (190mm)	5.0" (127mm)	1-3/4" (44mm)	3-7/8" (98mm)	4.3 lb. (1.97 kg)
5/8" x 3/4" (DN 15mm x 33mm)	7-1/2" (190mm)	5.0" (127mm)	1-3/4" (44mm)	3-7/8" (98mm)	4.4 lb. (2.00 kg)
3/4" (DN 20mm)	9" (229mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.4 lb. (2.90 kg)
3/4" x 1" (DN 20mm x 42mm)	9" (229mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.6 lb. (2.99 kg)
3/4" short (DN 20mm)	7-1/2" (190mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.2 lb. (2.81 kg)
1" (DN 25mm)	10-3/4" (273mm)	6-9/16" (167mm)	2-7/16" (62mm)	6-1/2" (165mm)	11.9 lb. (5.4 kg)

① With Rockslyn® measuring chamber.

Remote Reading Systems—For use with all sizes of Invensys Water Meters

All Invensys AMR systems work with the same absolute encoder Electronic Communications Registers (ECR), enabling the utility to mix and match or easily move from one system to another without changing registers for each.

The TouchRead® Automated Meter Reading and Billing System—is a multi-purpose encoder remote system suitable for indoor and/or outdoor use. The ECR Register uses a wired connection between the meter and an outside remote for inside set meters—or a pitlid mounted module, enabling underground meters to be read automatically without opening the meter box or vault. All wired connections and terminals of the TouchRead PitLid (TR/PL) modules and registers are fully sealed at the factory using a special process to ensure protection from water infiltration. The connection terminals of ECR/WP registers are also factory sealed.

Meters equipped for TouchRead System reading can be read with a visual reading device, stand alone AutoGun, and/or reading gun with an AutoRead HandHeld Device. For more information on TouchRead System equipment refer to bulletins AMR-TR, AMR-401, AMR-403, AMR-312 and EXSUMHH.

PhonRead® AMR—is a reliable telephone based call-in system that does not require batteries for operation. It also does not require equipment to be installed at telephone company facilities. PhonRead Meter Interface Units

(MIU) automatically call "in" to the utility office for transferring meter reading data from the meter site to a PC. PhonRead is a transparent AMR system that does not interfere with customers' telephone service. For more information refer to bulletins AMR-PR and AMR-302.

RadioRead® AMR—uses superior Direct Sequence Spread Spectrum modulation to provide reliable, safe and virtually interference free radio-based transmission of reading data from underground or inside-set meters that are equipped with Meter Transceiver Units (MXU). A choice of meter reading options is available. A radio frequency hand-held device (RF-HHD) can be used by a meter reader on foot. The RF-HHD can also be used to collect readings from TouchRead equipped meters, or for manual meter reading entries. A more powerful Vehicle Transceiver Unit (VXU) can be used in any car or truck to read meters while on the move. (A dedicated meter reading vehicle is not required.) For more information refer to bulletins AMR-RR, AMR-301 and AMR-303, and AMR-401.

MultiRead® Port Expanders—can provide the capability to connect multiple ECR equipped meters to a single PhonRead MIU or RadioRead MXU to save the utility time and money for installations such as apartment complexes and shopping centers. Refer to bulletin AMR-305, AMR-306 and AMR-308.



Invensys Metering Systems
P.O. Box 487
450 N. Gallatin Avenue
Uniontown, PA 15401
1-800-METER-IT
1-800-638-3748
FAX (Direct to Factory)
Local: (724) 439-7729
Toll Free: 1-800-888-2403
Web site: www.invensys.com
select North American Water
Email: h2oinfo@invensys.com

AUTHORIZED INVENSYS DISTRIBUTOR



iPERL Smart Water Meter

Electromagnetic Flow Measurement System

Sensus iPERL® smart water meters are designed to capture both lost water and lost revenue. The innovative magnetic technology delivers unmatched low flow registration and minimal pressure loss. With no moving parts, iPERL maintains its accuracy over a 20 year lifetime and is equipped with smart water alarms – delivering the intelligence you need to quickly resolve issues in the field.

Industry Leading Performance

The patented measurement technology of the iPERL water meter provides continuous and enhanced accuracy ranges at both low and high flows and perpetual accuracy over the life of the product. The iPERL meter has a 20-year accuracy warranty and a 20-year battery life guarantee. Over this 20-year lifespan, your iPERL will measure just as accurately as the day it was installed.

Construction

The iPERL meter body is available in two versions. The first version has a flow tube that is comprised entirely of composite polymer. The second version is comprised of lead-free bronze alloy with a composite polymer core. Both versions use the same thermal polymer shell with the same electronic register inside.

Electronic Register

The 9-digit hermetically-sealed electronic register with LCD display was designed to eliminate dirt, water, and moisture contamination in pit settings. The large, easy-to-read display includes AMI/AMR digits, direction of flow, units of measure, and empty pipe detection. The AMI/AMR digits and units of measure are fully programmable. The register also provides user configurable data logging.

Solid State Electromagnetic Technology

By avoiding the use of a mechanical measuring element inside the flow tube, metering performance is linear over the entire flow range – ensuring no reduction in accuracy at any flow rate over the life of the meter. The iPERL meter uses our patented remanent magnetic field technology – requiring far less energy and delivering superior accuracy.

Tamperproof

The integrated construction of the iPERL water meter prevents removal of the register to obtain free water. The magnetic tamper and low field alarms will both indicate any attempt to tamper with the magnetic field of the iPERL meter. The meter communication alarm indicates a possible cut cable.

Alarms

Quick resolution of field issues is made possible with smart water alarms including leak detection, reverse flow, empty pipe, magnetic tamper and low battery. When integrated with our FlexNet® communication network, remotely gathering and transmitting data has never been more reliable or profitable.

FEATURES

- 5/8", 5/8" x 3/4", 3/4" and 1" sizes available in potable and reclaim versions
- 3/4" and 1" available in residential fire service (UL 327b)
- Starts registering flow as low as 0.03 gpm (0.007 m³/hr)
- Can be installed horizontally, vertically or diagonally
- Compatible with current Sensus AMI/AMR systems

BENEFITS

- Maximize investment with iPERL's electromagnetic technology, which delivers a 20-year accuracy warranty, with no required maintenance, and no loss in accuracy over 20 years
- Smart alarms detect issues such as leaks, reverse flow, empty pipe, etc.
- Improve low flow accuracy to drive additional revenue

iPERL Smart Water Meter

Electromagnetic Flow Measurement System

Smart Alarms

iPERL meters have many configurable smart alarms designed to protect your utility's investment, enhance customer service, and monitor/optimize distribution systems. These alarms include:

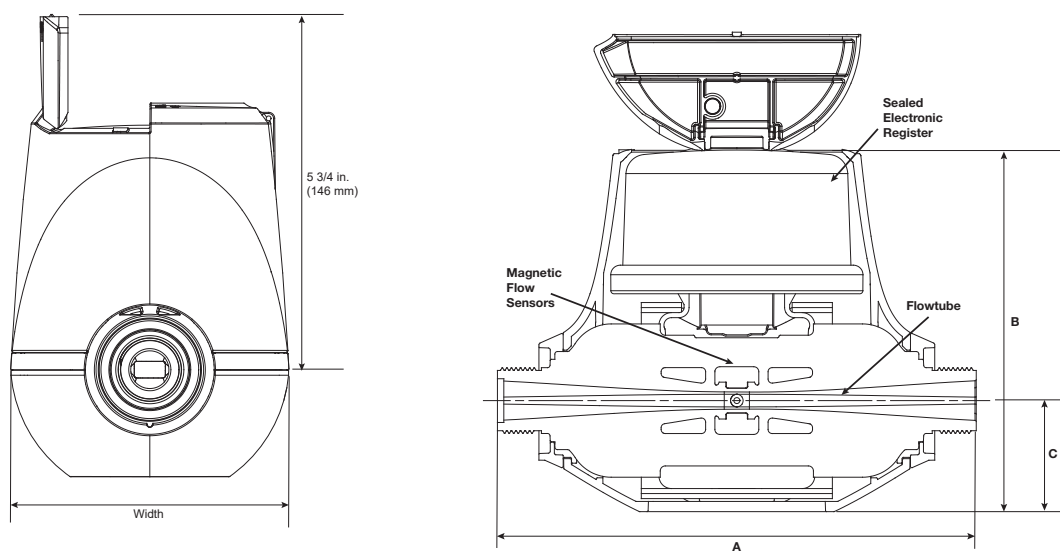
- Empty Pipe
Detects the absence of water in the flow tube and sends an alert. Allows you to identify main breaks downstream and water shortages for quicker resolution to ensure water availability. This alarm can also indicate the water meter has been removed from service, or notify you of potential tamper.
- Tampering
Detect magnetic interference to reduce apparent water losses and protect against unauthorized activities.
- Customer Leak
Detect continual consumption of water over a period of time to indicate downstream leaks. This protects your utility, infrastructure and customers through alarm notifications that can reduce water loss and leak adjustment costs.
- Low Battery
Replace your meters before they stop recording consumption through alerts indicating battery capacity to the meter or valve is running low.
- Reverse Flow
Keep untreated water from re-entering your distribution system and deter tampering attempts through an alarm triggered when reverse flow is detected at the meter.

SPECIFICATIONS

Service	Measurement of potable and reclaim water, and Residential Fire Service (UL 327b). 0-100% humidity. Fully submersible. IP68+ rated.			
Temperature Ranges	Water operating: Ambient air operating: Storage air:	33 °F (0.55 °C) to 80 °F (26.7 °C) -22 °F (-30 °C) to 140 °F (60 °C) -30 °F (-34.4 °C) to 158 °F (70 °C)		
Starting Flow	5/8" (DN 15 mm) size: 0.03 gpm (0.007 m3/h)	5/8" x 3/4" (DN 15x20 mm) size: 0.03 gpm (0.007 m3/h)	3/4" (DN 20 mm) size: 0.03 gpm (0.007 m3/h)	1" (DN 25 mm) size: 0.11 gpm (0.025 m3/h)
Low Flow Range (±3%)	5/8" (DN 15 mm) size: >0.10 gpm (0.025 m3/hr) to <0.18 gpm (0.041 m3/hr)	5/8" x 3/4" (DN 15 mm) size: >0.10 gpm (0.025 m3/hr) to <0.18 gpm (0.041 m3/hr)	3/4" (DN 20 mm) size: >0.10 gpm (0.025 m3/hr) to <0.18 gpm (0.041 m3/hr)	1" (DN 25 mm) size: >0.3 gpm (0.068 m3/hr) to <0.4 gpm (0.09 m3/hr)
Normal Water Operating Flow Range (±1.5%)	5/8" (DN 15 mm) size: 0.18 to 25 gpm (0.04 to 5.7 m3/hr)	5/8" x 3/4" (DN 15x20 mm) size: 0.18 to 35 gpm (0.04 to 8.0 m3/hr)	3/4" (DN 20 mm) size: 0.18 to 35 gpm (0.04 to 8.0 m3/hr)	1" (DN 25 mm) size: 0.4 to 55 gpm (0.09 to 12.5 m3/hr)
Maximum Operating Pressure	5/8", 5/8" x 3/4", and 3/4" size: 200 psi (13.8 bar) 1" size: 175 psi (12.1 bar)			
Measurement Technology	Solid state electromagnetic flow			
Register	Hermetically sealed, 9-digit programmable electronic register			
Capacity	10,000,000 gallons, 1,000,000 cubic feet or 100,000 m3 capacity			
Register Resolution	.01 gallons/imperial gallons, .001 cubic foot, or .0001 m3			
Conformance to Standards	Meets the requirements of NSF 61, Annex G and NSF 372. Exceeds the most current revision of AWWA Standard C-715.			
Materials	External housing - Thermal polymer Flowtube - Composite polymer or a bronze alloy flowtube with a composite polymer internal core		Electrode - Silver/silver chloride Register cover - Hermetically sealed glass	

iPERL Smart Water Meter

Electromagnetic Flow Measurement System



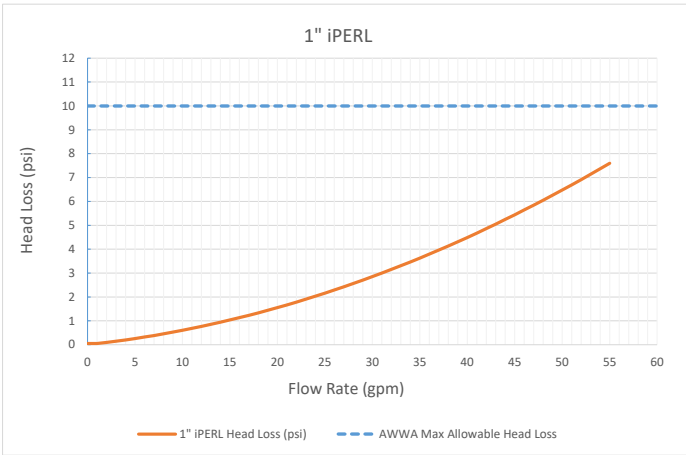
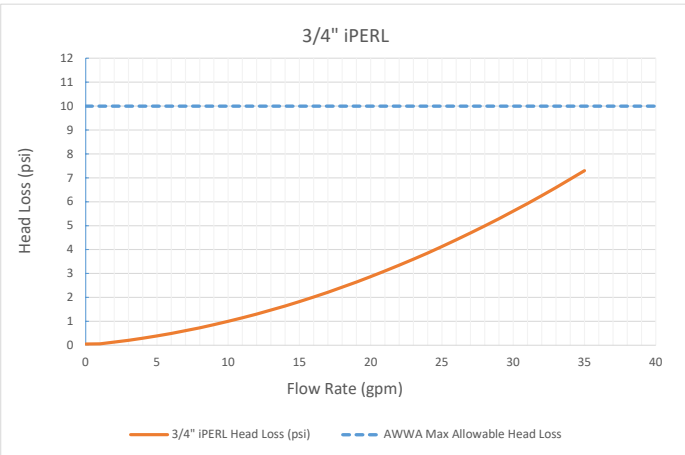
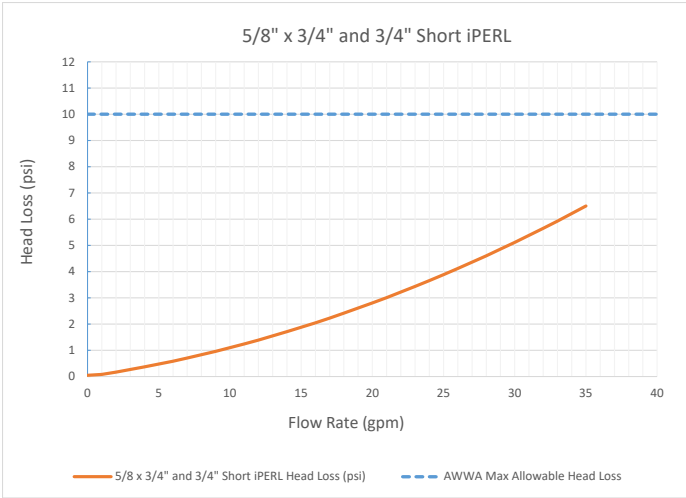
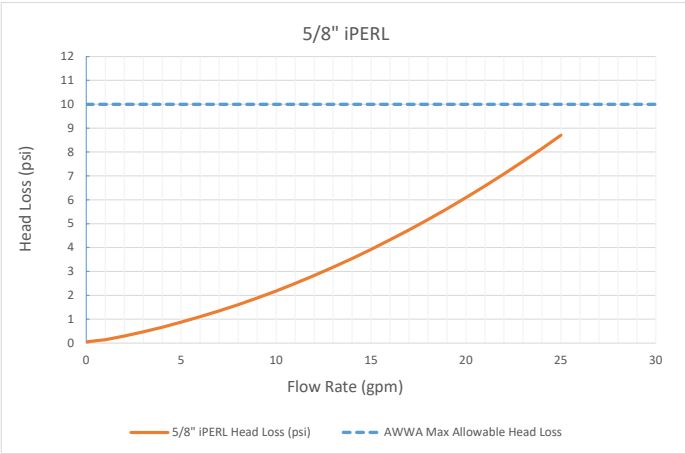
DIMENSIONS AND NET WEIGHTS

Meter Size	A	B	C	Spud Ends	NPSM Thread Size	Width	Net Weight
5/8" (DN 15 mm)	7-1/2" (190 mm)	6-1/10" (155mm)	1-3/4" (44 mm)	5/8" (15 mm)	3/4" (20 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
5/8" x 3/4" (DN 15mm x 20 mm)	7-1/2" (190 mm)	6-1/10" (155mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
3/4"Short (DN 20 mm)	7-1/2" (190 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
3/4" (DN 20 mm)	9" (229 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.2 lb. (1.45 kg)
1" (DN 25 mm)	10-3/4" (273 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	1" (25 mm)	1-1/4" (32 mm)	4-1/2" (114 mm)	3.3 lb. (1.5 kg)

iPERL Smart Water Meter

Electromagnetic Flow Measurement System

Head Loss Curves



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APPENDIX B – OFFICIAL RESOLUTION

The Official Resolution will be adopted at the Month day City Council meeting and submitted to the Bureau of Reclamation at sha-dro-fafoa@usbr.gov within the 30-day allotted time window following the July 9, 2024 application deadline.