

**Irrigation Water Conservation for the Upland Area of the Republican River using
Remote Meter Reading Technology**

in the

Lower Republican Natural Resources District

WaterSMART Water and Energy Efficiency Grant

Grant Application FOA# R24AS00052

Funding Group III



**Lower Republican
Natural Resources District**

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Executive Summary

Due Date: February 22, 2024

Applicant: Lower Republican Natural Resources District (LRNRD), Alma, Harlan County, Nebraska.

The LRNRD is proposing Phase II of an innovative real-time operational irrigation water management program for groundwater irrigated acres in the uplands surrounding the high stream depletion factor areas where groundwater in the alluvial aquifer of the Republican River Basin interacts with surface water in the Republican River. Upon the successful award of this proposal, the LRNRD will utilize funds from the District, the State of Nebraska, and the Bureau to deploy near real-time telemetry equipment on **1,800** irrigation flow meters within one of the most densely irrigated areas of the district for improved on-farm water management and reporting of water use to the district. Weather stations with telemetry will be deployed across the district to collect data necessary for evapotranspiration (ET_o) data that will be broadcast via the internet to all irrigators in the project area for local crop water use data to aid in irrigation scheduling. This project will greatly improve the on-farm groundwater conservation further incentivized through NRCS programs in the district and reduce or reverse the influence of groundwater depletion on the baseflow to the Republican River in the LRNRD. The availability of real-time water use data to the LRNRD will also improve management of water on a basin-wide scale and aid in the district's responsibilities related to the Interstate Compact on the Republican River between Colorado, Kansas, and Nebraska.

This project is expected to last three years, beginning in the winter of 2025-2026 and ending in 2028. This project is not located on a federal facility and the LRNRD does not receive water from Bureau projects.

Background Data

This project is intended to reduce groundwater irrigation extractions and increase long term groundwater and surface water availability in a region of Nebraska where significant conflict between surface and groundwater users exist. The LRNRD is in the lower reach of the Republican River Basin in Nebraska, which was the subject of a Basin Study, released by the Bureau of Reclamation in March 2016, that included the States of Nebraska, Kansas and Colorado as partners. The study indicated that declining groundwater levels and stream flows have created intense competition for limited water supplies, and litigation between the states of Kansas and Nebraska. The proposed project can help reduce rates of groundwater decline by providing irrigators and the LRNRD timely water use information that will improve water management decisions by both irrigators and the LRNRD.

Natural Resources Districts (NRDs) in Nebraska were created by state statute in 1972 and gained the authority to regulate irrigation development and water use in 1979 under the Nebraska Groundwater Management and Protection Act. In order to meet new requirements of the Republican River Compact, the LRNRD began its mandatory metering program in 2002 and was complete by 2005. The district manages groundwater extractions pursuant to state statute for 325,000 acres irrigated by 3,587 groundwater wells. The LRNRD currently enforces groundwater pumping allocations of 9 inches per acre on all of these acres per year over a five-

year period. Consequently, the allocation for LRNRD groundwater irrigators is 45 inches per acre over a five-year period. This current allocation period for LRNRD is 2023 through 2027.

LRNRD participated in a study with the USGS to document water level changes in the High Plains Aquifer and specifically, the Republican River Basin between 2002 and 2015. By 2002, water levels in the High Plains aquifer in parts of Texas and southwestern Kansas had declined more than 150 ft and, in the Republican River Basin, had declined more than 50 ft. Water levels were measured in 977 wells which were screened in the High Plains aquifer within the Republican River Basin. The area-weighted, average water-level change from 2002 to 2015 for the High Plains Aquifer within the Republican River Basin was a decline of 4.5 feet. (McGuire, V.L. 2017)

The University of Nebraska-Lincoln Conservation Survey Division's annual report has also documented significant groundwater declines in the Republican River Basin. This report has identified groundwater declines between 5 and 20 feet in the areas designated for this project from predevelopment to the Spring of 2019. The groundwater declines in this portion of the LRNRD over the last thirty-five years could easily represent a loss 10 – 20% of the saturated thickness of the local aquifer. The LRNRD intends to implement this innovative and proactive program that will have the potential of slowing or reversing these groundwater declines in the Lower Republican NRD through improved irrigation water management. (Young, A.R. et. Al., 2019)

LRNRD adopted its 5th generation Integrated Management Plan which became effective on **September 27, 2021**. An IMP is jointly developed and adopted by Nebraska DNR and an NRD for integrated surface water and groundwater management within the NRD. This IMP between Nebraska DNR and LRNRD is required under *Neb. Rev. Stat.* § 46-715 (1)(a). The entirety of LRNRD was determined to be fully appropriated on July 16, 2004, under the requirements of LB962 Laws 2004, Sec. 60 (3)(b). Under this legislation, areas for which Nebraska DNR had previously determined a joint action plan was necessary, under prior law, were designated as fully appropriated as of the operative date of LB962 (2004).

In addition to this IMP, integrated water management within LRNRD is also subject to an interstate water compact and a basin-wide plan. The Republican River Compact (Compact, 1943) is an interstate agreement among Nebraska, Kansas, and Colorado that provides for the apportionment of the Virgin Water Supply of the Republican River Basin among the three states. The Final Settlement Stipulation (FSS, 2002) and RRCA Resolutions define how compliance within the Compact's requirements is to be determined, including detailed accounting procedures and the use of a jointly developed groundwater model. The current jointly developed groundwater model is called the RRCA Groundwater Model. The Republican River Compact Administration (RRCA) administers the Compact and consists of one Commissioner from each of the three states. This IMP must ensure compliance with the Compact.

Phase I of this project is currently underway which will deploy approximately 1,000 meters with telemetry on irrigation wells in the High Stream Depletion Area of the Republican River Valley with funding from an FY'22 WaterSMART grant. Because of the water savings experienced locally and wide-spread acceptance of remote technology aiding irrigation management in the region, the LRNRD proposes with this application to deploy remote meter-reading technology in the uplands surrounding the high stream depletion factor area around the Republican River

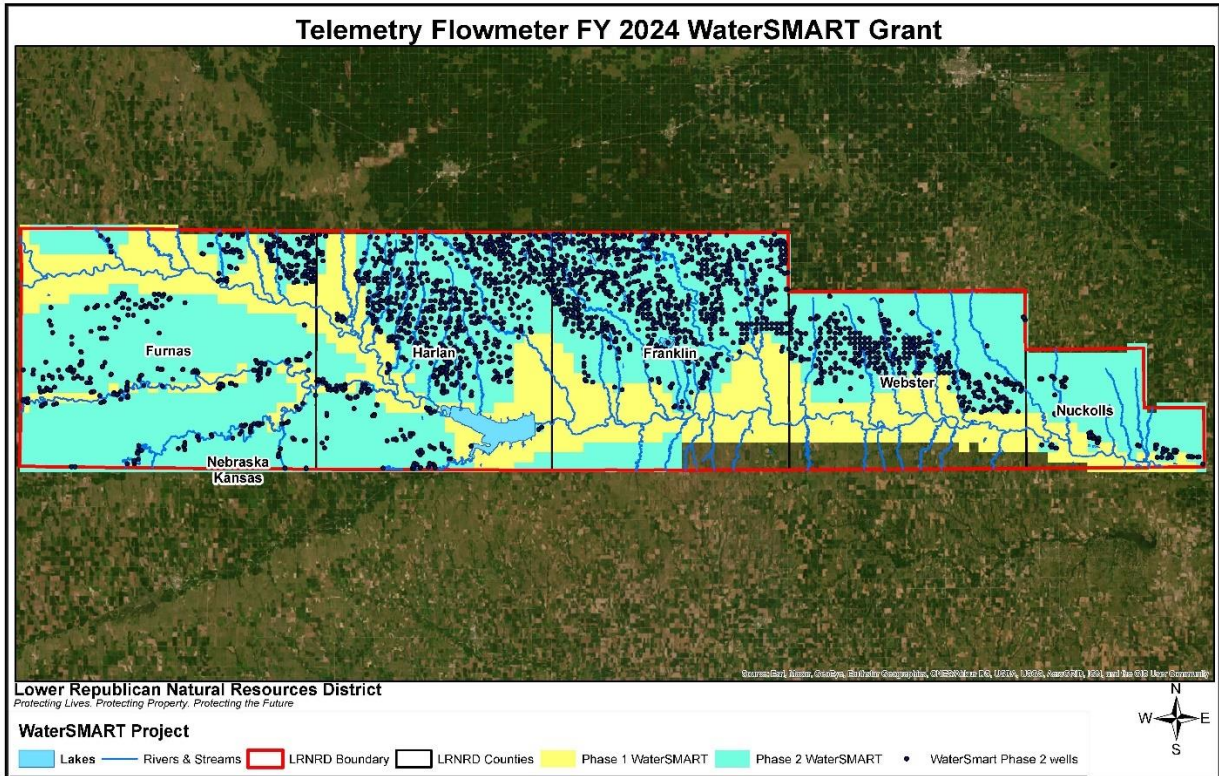
within the LRNRD by upgrading **1,800 meters** with remote cellular technology from McCrometer. The wells in this project area supply water to **224,425 irrigated acres** in the district. In addition, LRNRD proposes to deploy **eight** weather stations in upland areas equipped with sensors necessary for capturing crop water use or evapotranspiration (ET_o) data across the district to provide irrigators with local crop water use to better schedule irrigation water events.

In addition to the telemetry and remote reading capabilities of the meters, LRNRD is working with a database company to create a dashboard that will not only provide daily information about water use to the district but will have a producer component that will allow them to track usage and weather data from their digital devices. The NRD app will also include information about soil health and nitrogen use efficiency to help monitor water quality. 17 of the 23 Natural Resources Districts have partnered with the Nebraska Natural Resources Commission, the Nebraska Corn Board, the Natural Resources Conservation Service and local Cooperatives to help producers have this information available at all times in order to make better on-farm decisions with near real-time data.

The LRNRD has good history of cooperating with the Bureau of Reclamation and other federal agencies by recently completing a Small-Scale Water Use Efficiency grant project entitled “*Real-Time Water Use Data Delivery System for LRNRD*, Agreement #**R17AP00169** and is currently in the process of implementing a Water and Energy Efficiency Grant under FOA# **R22AS00023**. The district also cooperated with the Bureau in the *Republican River Basin Study* published in March, 2016. LRNRD further cooperated with the USGS in their study “*Water-Level Changes in the High Plains Aquifer, Republican River Basin in Colorado, Kansas, and Nebraska, 2002 to 2015*” published in March 2017. The proposed project represents the Phase 1 of LRNRD’s initiative to upgrade all irrigation flow meters in the district with remote telemetry for enhanced irrigation and groundwater management.

Project Location

The LRNRD is in south central Nebraska and headquartered in Alma, NE. The district includes all or parts of Furnas, Harlan, Franklin, Webster, and Nuckolls Counties. The project area is shaded in green in the map below and includes parts of each of these counties. The project area is the uplands surrounding the High Stream Depletion Factor area of the LRNRD in southcentral Nebraska which was the target area for Phase I of the Telemetry Flowmeter project in LRNRD.



Technical Project Description

This project will implement several water management tools with remote data collection capabilities to provide water use and environmental data in near real-time to agricultural water users as well as district water managers. This will improve irrigation water management on the farm as well as on a watershed-basin level for groundwater wells in each of the counties of the LRNRD creating a real-time operational model to evaluate current pumping allocations and guide decisions regarding future allocations.

LRNRD has required flowmeters on all irrigation wells in the district since 2005. **3,587** active registered irrigation wells currently exist in the district, **2,530** of which are in the uplands surrounding the highest stream depletion factor area of the Republican River. This project will deploy remote cellular telemetry technology on **1,800 irrigation flow meters** improving the irrigation management on **224,425 acres** in the LRNRD. The predominant irrigation flow meter in the district is the mechanical McCrometer propeller meter. McCrometer's remote cellular technology integrates built-in communications to the meter for transmitting accurate, reliable irrigation flow data. This innovative design eliminates cables, pole mounting, solar panels, and other components – removing unnecessary costs and improving data quality by reducing opportunities for noise interference or cable damage. McCrometer's ExactRead technology ensures the totalizer reading on the meter's register in the field and the totalizer remotely viewed on the web are always the same. Flow data is generated and transmitted directly from the meter register. Consequently, no raw pulse data is communicated that can lead to incorrect water volume calculations.



Solar-powered weather stations for local crop water use will be deployed throughout the district in conjunction with this Water Smart project. Water measurement tools and methods to be utilized under the project, Water Balance or Checkbook Method, are proven and is a well-known tool for irrigation scheduling. The premise of the tool is to balance water being extracted from the soil (via evaporation and plant transpiration) with water being added to the soil (via irrigation and rainfall). Typically, automated weather stations are used to measure specific environmental conditions and then specific formulas are used to calculate reference ET and/or estimate effective rainfall. Crop specific coefficients will be applied to ET values to fine tune water use. When used consistently with reliable field data, the water balance index can show growers how closely their irrigation practices are meeting the current plant water use demand.



Local contractors proficient in meter installation and remote telemetry will be selected from previous work done on irrigation projects within the area. All water use data (meter data), crop

water use, and soil-moisture (if applicable) will be served to farmers through a web-based server on a single website accessible via personal computer or smartphone. Farmers in this program will no longer need to go to separate websites to obtain different pieces of water management data for irrigation management decisions.

Evaluation Criteria

Evaluation Criterion A—Quantifiable Water Savings: *Up to 25 points may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency, supporting the goals of E.O. 14008. Points will be allocated based on the quantifiable water savings expected as a result of the project. Points will be allocated to give greater consideration to projects that are expected to result in more significant water savings.*

All applicants should be sure to address the following:

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.

All irrigation wells in the LRNRD have been required to be metered since 2005. As a result, historical groundwater pumping records are available for this area. 2022 is the most-recent year for which complete groundwater pumping records are available for the project area. 2022 is also a representative year for groundwater use in the area not being extremely wet or dry. The total groundwater extraction measured in the project area in 2022 was **183,290** acre-feet (AF).

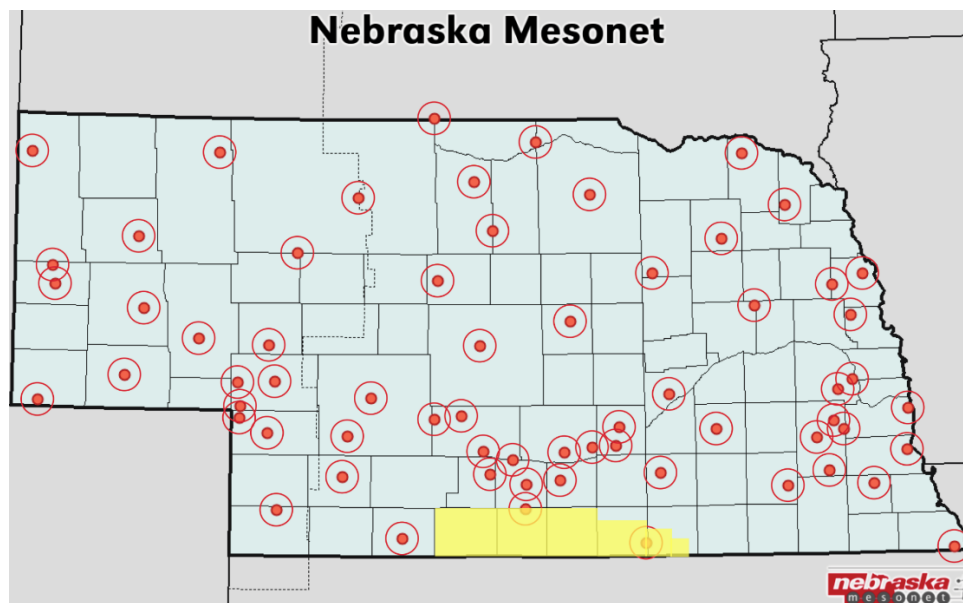
The adjacent groundwater conservation district, Middle Republican NRD (MRNRD), in recent years has implemented a similar program to deploy remote telemetry and other water management sensors for groundwater conservation through irrigation water management with success. MRNRD has experienced water savings of **0.47 in/ac** from the installation of meters with real-time telemetry for improved on-farm irrigation water management. LRNRD Board and Staff expect to see the similar water savings from the same practice.

LRNRD estimates that approximately **8,790 acre-feet (AF)** of water will be conserved per year as a result of the application of remote telemetry to irrigation flow meters and other water management sensors for improved irrigation management in the upland area outside of the High Stream Depletion Factor Area of the LRNRD. Real-time telemetry will aid farmers in their on-farm water management decisions which will affect water conservation in the project area going into the future. Several studies have shown that the presence and use of flowmeters impacts producer behaviors, such that groundwater pumping is less on wells with flowmeters (Irmak, Et al, 2022)

Water measurement tools and methods to be utilized under the project are proven, including the Water Balance or Checkbook Method that is a well-known tool for irrigation scheduling. The premise of the tool is to balance water being extracted from the soil (via evaporation and plant transpiration) with water being added to the soil (via irrigation and rainfall). Typically, automated weather stations are used to measure specific environmental conditions and then specific formulas are used to calculate reference ET and/or estimate effective rainfall. Crop specific coefficients will be applied to ET values to fine tune water use. When used consistently with reliable field data, the water balance index can show growers how closely their irrigation practices are meeting the current plant water use demand. The general use of irrigation

scheduling, which will be made easier and more effective by supplying crop water demand information available under the proposed project, was shown to reduce water applications by 11 percent in Nebraska (Kranz et al., 1992).

The map below represents the weather station coverage in the Nebraska Mesonet System (<https://www.mesonet.unl.edu>). The coverage is noticeably vacant in the (highlighted) LRNRD with only one station located at the eastern edge of the LRNRD's boundaries. Additional weather station coverage is needed within the LRNRD and will be addressed with the deployment of **eight** full weather stations equipped with the sensors necessary to calculate evapotranspiration (ET) for the project area.



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, or seeping into the ground)?

Groundwater applied as irrigation water is currently lost due to deep percolation from the crop root zone and runoff which can result in off-site transpiration and evaporation resulting in non-beneficial uses. The deployment of real-time telemetry devices on irrigation flow meters, weather stations, and other water management sensors will aid in reducing and limiting these water losses by improving the seasonal timing of irrigation water applications closer to the needs of the crops as well as improving the application efficiency of water applications. Currently annual groundwater pumping in the uplands surrounding the High Stream Depletion Factor Area is just over **183,290 AF/yr**. If irrigation systems operated at **85%** efficiency, operational losses would be approximately **27,494 AF/yr** (15% lost).

Groundwater that is conserved will remain in the local aquifer to maintain groundwater levels for future irrigation events as well as improved discharge for baseflow in the Republican River. LRNRD estimates that approximately **8,790 AF/yr** will be saved throughout the project area through improved irrigation management practices. Once this estimated improvement in irrigation efficiency is achieved, this would represent nearly a **32% reduction** in operational losses.

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?

Current losses are not being used by other water users. Current losses are to non-beneficial uses including irrigation runoff and deep percolation.

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?

No. The current losses to the system are non-beneficial. Current losses include deep percolation which results in an economic loss to the irrigator and immobilization of water in the local vadose zone and runoff which is another loss to the irrigator and may result in off-site (non-beneficial) transpiration. This project will improve the efficiency of irrigation in LRNRD and limit these losses to the local groundwater aquifer.

Describe the 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.

Annual water pumping in the LRNRD project area was measured in 2022 at **183,290 AF**. The land area in the uplands surrounding the High Stream Depletion Factor Area is **224,425 acres**. Annual water savings of **0.47 inches/acre** is expected from the implementation of real-time telemetry for improved irrigation water management. Once the expected groundwater savings of **0.47 inches/ac** is achieved through improved irrigation water management, the groundwater use in LRNRD will be reduced by 0.47 in/ac/year or **8,790 AF/year** in the LRNRD project area.

Projected Water Savings (0.47 in/yr) (224,425 ac) = 105,480 acre-inches/yr

(105,480 acre-inches/yr) (1.0 AF/12 acre-inches) = 8,790 AF/yr

Total Estimated Annual Water Savings = 8,790 AF/year

4) Please address the following questions according to the type of infrastructure improvement you are proposing for funding:

***Irrigation Flow Measurement:** Irrigation flow measurement improvements can provide water savings when improved measurement accuracy results in reduced spills and over-deliveries to irrigators. Applicants proposing municipal metering projects should address the following:*

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.

Conservative estimates of **0.47 acre-inches/yr** in water savings are projected on **224,425 acres** in the project area from improved irrigation water management through the implementation of real-time irrigation water use. Weather stations with telemetry will be installed as a component of this project which will provide accurate and local evapotranspiration (ET) data to agricultural producers for irrigation scheduling.

The following water conservation calculations are based on saving 0.47 acre-inches/yr on 224,425 acres within the LRNRD project area for a total of 8,790 AF/yr.

$$(0.47 \text{ acre-inches}) (224,425 \text{ acres}) = 105,480 \text{ acre-inches of water conserved annually}$$
$$(105,480 \text{ acre-inches/yr}) (1.0 \text{ AF}/12 \text{ acre-inches}) = \mathbf{8,790 \text{ AF/yr Total Annual Water Conservation}}$$

b. Have current operational losses been determined? If water savings are based on a reduction of spills, please provide support for the amount of water currently being lost to spills.

Yes, Current water use has been quantified in the uplands surrounding the High Stream Depletion Factor Area by metering extractions at all groundwater irrigation wells. The most recent annual groundwater pumping in the project area from 2022 has been measured to be **183,290 AF/yr**.

This volume represents total groundwater application on all irrigated acres and average application efficiency of all irrigation types is considered to be at least 85%. It would be reasonable to estimate current operational losses to be equal to the remaining 15% or **27,494 AF/yr**. Operational losses would be due to deep percolation, runoff, evaporation, and off-site transpiration due to current inefficiencies. If estimated water conservation of **8,790 AF** due to Improved Application Efficiency were achieved, this would represent a **32%** reduction in operational losses in the uplands surrounding the High Stream Depletion Factor Area.

Estimated Water Conservation / Annual Losses = Percent Reduction in Losses

$$8,790 \text{ AF} / 27,494 \text{ AF} = 0.3197 \text{ or } \mathbf{32\% \text{ Reduction in Losses}}$$

c. Are flows currently measured at proposed sites and if so, what is the accuracy of existing devices? How has the existing measurement accuracy been established?

Yes, the predominant meter used for irrigation water measurement in the LRNRD is the McCrometer propeller meter. The McCrometer propeller meter is manufactured and individually tested to be +/- 2 % accurate when properly installed. This accuracy is determined by factory gravimetric testing ensured by NIST (National Institute of Standards and Testing) traceability. A significant percentage of meters currently installed have been discovered not to be installed to manufacturer's specifications making them as much as 10.8% inaccurate due to a state requirement for backflow protection devices on all irrigation wells which occurred after flow meters were installed. These inaccuracies will be corrected at the time of upgrade with the installation of flow conditioning devices by the installation contractor. Improved measurement will improve not only management, but also the quality and accuracy of data, reported to the LRNRD and state agencies for Interstate Compact Compliance and basin-wide water management which reaches across state boundaries.

d. Provide detailed descriptions of all proposed flow measurement devices, including accuracy and the basis for the accuracy.

The McCrometer MO300 Bolt-on saddle propeller meter will continue to be used at each groundwater metering site. The +/- 2% accuracy will remain the same. Additionally, all meters will be installed to meet or exceed manufacturer's specifications with the FS100 Flow Straightener, a flow conditioning device manufactured by McCrometer that corrects disturbances created by backflow protection or chemigation valves, pumps, elbows, or other disturbers. NIST

traceability will continue to be the basis for this accuracy. In addition, each meter will be upgraded to McCrometer telemetry with digital registers capable of ExactRead™ technology. ExactRead™ technology ensures 100% data transmission accuracy between the meter in the field and the website.

e. Will annual farm delivery volumes be reduced by more efficient and timely deliveries? If so, how has this reduction been estimated?

Yes, Seasonal efficiency, which improves timing of irrigation events throughout the season, and application efficiency, or more precise individual irrigation events, will be improved through better irrigation water management as a result of utilizing real-time data for irrigation water applied, crop water use, and in some cases, soil moisture monitoring. As described earlier, this is expected to be **0.47 inches/ac** due to implementation of real-time meter and ET data acquisition.

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

Upon the completion of this project, post-telemetry water application will be compared to water applications previous to the installation of telemetry-aided water management sensors to measure reductions in groundwater pumping.

Evaluation Criterion B—Renewable Energy (20 points) *Up to 20 points may be awarded based on the extent to which the project increases the use of renewable energy or otherwise results in increased energy efficiency and reduced greenhouse gas emissions.*

Since this project addresses increased irrigation efficiency through irrigation management by the installation of permanently installed totalizing flow meters with telemetry, Subcriterion B.2 will be completed and address the savings in power consumption in the LRNRD Project Area as a result of this project

Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

Up to 6 points may be awarded for projects that address energy demands and reduce greenhouse gas emissions by retrofitting equipment to increase energy efficiency and/or through water conservation improvements that result in reduced pumping or diversions.

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

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 representative value for irrigation well power consumption of **333.1 kWh/AF** was obtained from district records where power coefficients were used in lieu of meter readings due to a meter failure. This will be used as a representative value for electrical consumption for irrigation pumping in the project area for the following calculations. As stated under Criteria A, annual water consumption in LRNRD was measured to be **183,290 AF** in 2022. Consequently, a reasonable estimate for the annual power consumption in LRNRD to pump irrigation water is **61,053,899 kWh/yr**. The projected groundwater savings derived from improved irrigation water management and reporting is estimated to be **8,790 AF/yr** or **4.8%** of water pumped as a result of this project. This would equate to **2,930,587 kWh/yr** in power savings as demonstrated in the following equations:

(333.1kWh/AF) (183,290 AF/yr) = 61,053,899 kWh/yr = Annual Estimated Electrical Consumption

(61,053,899 kWh/yr) (4.8%/yr water savings) = **2,930,587 kWh/yr Estimated Power Savings from Water Conservation.**

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

Since much of the electricity used in the project area is still generated by fossil fuels, any reduction in electrical consumption will reduce greenhouse gas emissions. In this case, an 4.8% reduction in irrigation pumping will have a significant effect on electrical savings reducing the reliance on fossil fuels used to generate electricity in the region. With less reliance on fossil fuels for generation of electricity, a greater portion of the electricity used will come from renewable sources such as solar and hydropower.

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?

Most irrigation wells in LRNRD are vertical turbine pumps powered by 70 horsepower electric (or similar) motors. District records showed electrical usage was approximately **333.1 kWh/AF** of irrigation water produced. Water savings through enhanced irrigation water management is expected to reduce groundwater pumping by **4.8%** annually in LRNRD which will have a commensurate reduction on energy usage in the district. An 4.8% reduction in pumping is estimated to result in energy savings of **2,930,587 kWh/yr.**

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.

All energy savings calculations are based on the use of power at the point of diversion which is the irrigation well that extracts groundwater from the local aquifer. No alternate site of diversion will be implemented in this project.

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

No. This project does not involve water treatment, only the improved management of irrigation water in LRNRD so **no** power requirements are needed for water treatment.

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

Yes. LRNRD employs three staff members that regularly read and perform maintenance on currently installed irrigation flow meters in the district. The district conservatively estimates that district staff drive **60,000 miles per year** solely for reading meters. The district estimates that upon the conclusion of this project, the miles driven will be reduced by at least **75%** to **15,000 miles per year.**

Achieving the goals of this project would not be possible without the deployment of real-time telemetry. Approval of this proposal will prevent thousands of miles driven and in turn the production of greenhouse gases by LRNRD employees in the future.

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).

The remote cellular telemetry units that will be deployed under this program have a solar powered option used for frequent readings. These units utilize cellular telemetry communications and are powered by a 540-mA solar panel eliminating the need for commercial power sources to power the telemetry system. Since each system will be a cellular node, the communications system will be independent of a capital-intensive system of towers that would be necessary for a traditional radio telemetry system. Weather stations equipped with remote telemetry deployed under this project will also be solar-powered by 540-mA solar panels independent of commercial power.

Evaluation Criterion C—Sustainability Benefits (15 points): *Up to 15 points may be awarded under this criterion. 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.*

Resilience and Sustainability Benefits. Will the project address a specific water and/or energy sustainability concern? Please address the following: Explain and provide detail of the specific issue(s) in the area that is impacting water resilience and sustainability. Consider the following:

- ***Describe recent, existing, or potential drought or water scarcity conditions in the project area.***

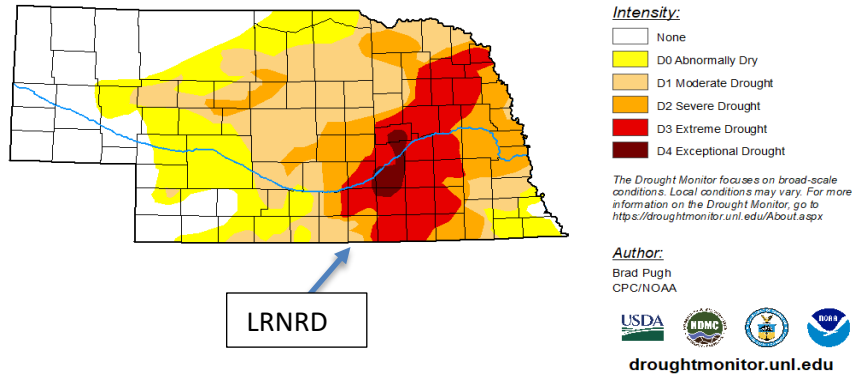
The Republican River Basin is designated fully-appropriated by the Nebraska Department of Natural Resources (NDNR) for water resources negatively affecting groundwater levels and surface water flows in the Republican River. The LRNRD is in the lower reaches of the Republican River Basin in Nebraska, which was the subject of a Basin Study, released by the Bureau of Reclamation in March 2016, that included the States of Nebraska, Kansas and Colorado as partners. The study indicated that declining groundwater levels and stream flows have created intense competition for limited water supplies, and litigation. The proposed project can help reduce rates of groundwater decline from drought and increased demand by providing irrigators and the LRNRD timely water use information that will improve water management decisions by both irrigators and the LRNRD.

- ***Is the project in an area that is experiencing, or recently experienced, drought or water scarcity?***

Yes, this area has been significantly impacted by drought for the past several years. Much of the project area in LRNRD is currently or was recently designated as either **severe, extreme, or exceptional** drought by the Drought Monitor published by the National Drought Mitigation Center at the University of Nebraska-Lincoln.

**U.S. Drought Monitor
Nebraska**

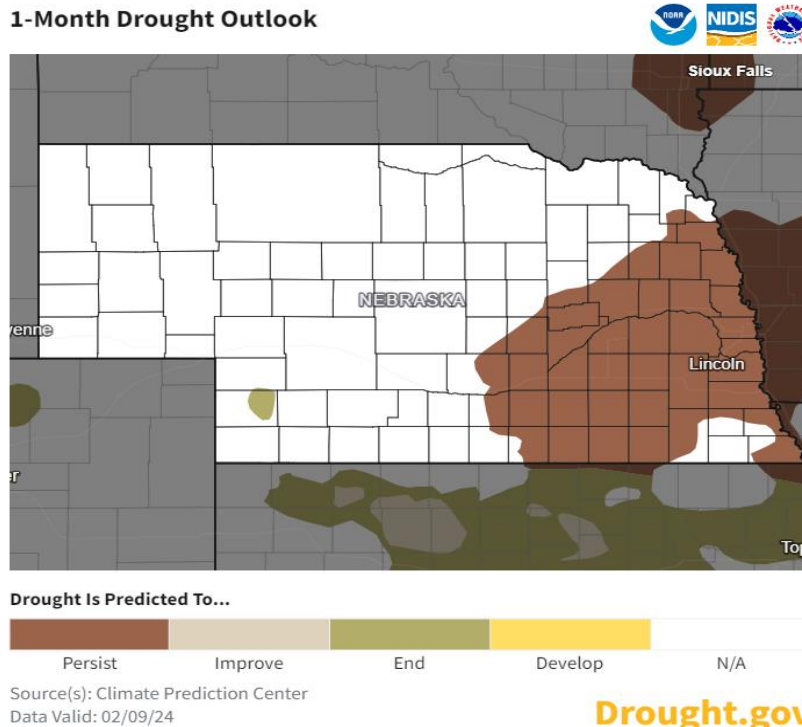
August 8, 2023
(Released Thursday, Aug. 10, 2023)
Valid 8 a.m. EDT



- Describe any projected increases to the severity or duration of drought or water scarcity in the project area. Provide support for your response (e.g., reference a recent climate informed analysis, if available).

According to the National Integrated Drought Information System (NIDIS), the 1-month outlook for much of south-central and eastern Nebraska is that drought is expected to persist (www.drought.gov). The project area has been highly-susceptible to drought in past years and this project will make it more resilient to drought conditions.

1-Month Drought Outlook



- *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.*

Irrigated agriculture is the focus of this proposal which will conserve water through improved irrigation efficiencies through the implementation of the LRNRD Integrated Management Plan. Irrigation wells are powered by either electricity or internal combustion engines to extract groundwater from the local aquifer. Improving the irrigation efficiency of farms in LRNRD will reduce the volume of groundwater pumped and consequently the amount of energy consumed either in the form of electricity or fossil fuels which will have positive effects on energy sustainability in Nebraska. Improved groundwater management through irrigation efficiency will reduce the electricity demand in the Republican River Basin. Conserving groundwater as proposed in this application will improve the supply of power to this area of the State of Nebraska. This area is subject to Load Control by the local power districts that require producers to suspend irrigation during the hottest days of the summer due to peak demand being more than the power grid can handle. The reduction of any irrigation pumping will provide the grid with better reliability in the long term.

- *Please describe how the project will directly address the concern(s) stated above.*

Water conservation through voluntary methods of irrigation efficiency and improving compliance with district Rules and Regulations are the primary methods of achieving groundwater sustainability in LRNRD. Irrigation efficiencies will be achieved through providing real-time water use as well as local ET to irrigators for improved on-farm irrigation management. Compliance with LRNRD groundwater allocations will inevitably reduce pumping by the growth of lower water use plants or fallowing land which will not only reduce power demands, but also store more water in the local aquifer. Improving aquifer storage will improve the ability of water users in the area to better meet water demands during times of drought or water shortage due to climate change.

- *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?*

Yes. Acquiring irrigation water application data and crop water use in real-time will aid farmers in making irrigation scheduling decisions. Real-time water application data will have the potential to make individual irrigation applications more efficient and precise while real-time crop water use data has the potential to improve timing of application or seasonal irrigation efficiency. This information will alert the irrigators to current environmental factors that may delay or make an irrigation event unnecessary, thus conserving groundwater for future use and support the life of the local aquifer.

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.

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

LRNRD estimates that approximately **8,790** acre-feet (AF) of water will be conserved per year because of the application of remote telemetry to irrigation flow meters and other water management sensors for improved irrigation management in the Project Area of the LRNRD. Real-time telemetry will aid farmers in their on-farm water management decisions which will

affect water conservation in the project area, maintain groundwater levels, and assist the LRNRD and the State of Nebraska in meeting the Interstate Compact Requirements on the Republican River with Kansas.

The proposed project can help reduce rates of groundwater decline from drought and increased demand by providing irrigators and the LRNRD timely water use information that will improve water management decisions by both irrigators and the LRNRD. Water conservation through voluntary methods of irrigation efficiency and improving compliance with district Rules and Regulations are the primary methods of achieving groundwater sustainability in LRNRD. Irrigation efficiencies will be achieved through providing water measurement to irrigators for improved on-farm irrigation management. Compliance with LRNRD groundwater allocations will inevitably reduce pumping by the growth of lower water use plants or fallowing land which will not only reduce power demands, but also store more water in the local aquifer. Improving aquifer storage will improve the ability of water users in the area to better meet water demands during times of drought or water shortage due to climate change.

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

Deployment of real-time telemetry will deliver water use and ET data directly to landowners within the NRD for improved management of irrigation water. This water conservation program within LRNRD would be virtually impossible without permanently installed totalizing flow meters equipped with remote telemetry. For an allocation program to work, clear and concise rules and regulations are necessary for the water user. In addition, accurate measurement of water pumped is necessary to ensure compliance with pumping allocations. Automated data transmission of groundwater extraction will be delivered to the LRNRD water managers as well as individual water users. The delivery of water use data through real-time telemetry is the most efficient method of accessing large amounts of data from numerous points on a frequent basis. Water conserved under the LRNRD's allocation and water conservation program will remain in the local aquifer for future sustainable uses to the benefit of all water users.

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

Yes. LRNRD is one of the district agencies responsible for maintaining compliance between the States of Nebraska, Colorado, and Kansas with the **Interstate Compact on the Republican River**. Water consumption reduced under the project will help ensure that Nebraska's Compact allocation will not be exceeded. It will also reduce the amount of water use in excess of the allocation that must be offset by increasing stream flow via streamflow augmentation projects developed in the Republican River Basin by improving groundwater discharge to the Republican River from aquifers closest to the river. The project will help prevent and/or reduce statewide liability for noncompliance that include significant penalties. The State of Kansas recently sought, but did not successfully receive, a court judgement of approximately \$70 million for Nebraska's noncompliance with the Compact in 2005-2006.

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

Yes, other districts in the Republican Basin are experiencing conflicts over water use due to water shortages and compliance with water use regulations. Availability of real-time water use

data from irrigation flow meters for the district and individual users will improve visibility to water use and compliance with local water use regulations. As an example, the State of Kansas recently sought, but did not successfully receive, a court judgement of approximately \$70 million for Nebraska's noncompliance with the Compact in 2005-2006.

Ecological Benefits. In addition to the separate WaterSMART Environmental Water Resources Projects NOFO, this NOFO places a priority on projects that result in ecological benefits, through this section and other sections above, consistent with the SECURE Water Act. Please provide information regarding how the project will provide ecosystem benefits, including the following:

- ***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).***

Yes. Since the project seeks to conserve groundwater resources that are hydrologically linked to surface water, this project will improve ecological resiliency for wildlife habitat of waterfowl, fish, and other species that live in or near Harlan County Lake, the Republican River, and its tributaries. This project will not only support sustainability of water resources for a variety of human uses but will also improve the sustainability of water resources linked to wildlife habitat in the project area. In addition, the Republican River Basin is in the North American migratory flyway of the Whooping Crane and Sandhill Crane. This project will improve the water supply that contributes to the habitat of these migratory birds.

- ***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, recreational benefits, etc.).***

Yes. Water conserved due to reduced groundwater pumping will remain in the local aquifer to maintain groundwater levels for other uses including municipal, industrial, and domestic as well as improve baseflow for surface water uses in the Republican River Basin.

- ***Will the proposed project reduce the likelihood of a species listing or otherwise improve the species status?***

Yes. This project will benefit not only the species but will also support the habitat of these threatened or endangered species as well.

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

With improved irrigation efficiency, there will be a reduced chance of leaching fertilizers and pesticides past the root zone and eventually into the aquifer. Since groundwater is the source of drinking water in LRNRD, prevention of contamination will protect human health. By applying fertilizers and pesticides to the appropriate quantity, material costs will be reduced and more efficient distribution in the supply chain will occur. Additionally, with proper irrigation, the opportunity for harmful compounds in runoff will be minimized. This will protect surface water, for fish and wildlife, and humans.

Aside from water sustainability for human uses and wildlife benefits, this project will have benefits for wetlands and riparian habitat as well. Harlan County Lake is a major water feature of the project area which is fed by flows in the Republican River and its tributaries. Improved baseflow in the Republican River as well as its tributaries will maintain water levels in Harlan County Lake and support miles of riparian habitat in the area which is important for fish, waterfowl, and their habitat along the lake shore, the Republican River and its tributaries.

Note: Projects that are intended to improve streamflows or aquatic habit, and that are requesting \$500,000 or more in Federal funding, must include information about plans to monitor the benefits of the project. Please describe the plan to monitor improved streamflows or aquatic habit benefits over a five-year period once the project has been completed. Provide detail on the steps to be taken to carry out the plan.

Not Applicable. The direct effect of this project is groundwater conservation through enhanced irrigation management. Improved flow in the Republican River may be an indirect effect of the project, but the goal of this project is groundwater conservation which will sustain groundwater levels that may have an indirect effect on flows in the Republican River.

Climate Change: E.O. 14008 emphasizes the need to prioritize and take robust actions to reduce climate pollution; increase resilience to the impacts of climate change; protect public health; and conserve our lands, waters, oceans, and biodiversity.

- *Describe how the project addresses climate change and increases resiliency. For example, does the project help communities adapt to bolster drought resilience?*

Yes. Real-time telemetry will gather continuous data that will ensure the highest accuracy of (and greatest confidence in) groundwater extractions within the LRNRD. Daily water meter records gathered in real-time will provide water users and district water managers with crucial information for on-farm water management as well as basin-wide water management. Real-time data access to water use from meters as well as water management sensors such as weather stations for local crop water use (ET) will increase efficiency of on-farm water use and therefore conserve water stored in the local aquifer for times of water shortage.

Remote cellular units will regularly supply groundwater extraction data from irrigation wells in real-time without the need for LRNRD staff to drive to the well sites enhancing the environment by conserving staff time and resources including vehicle emissions, mileage, and wear and tear. Frequent water use data available to district water managers will improve water management on the basin level enabling practices such as the LRNRD Integrated Management Plan to benefit districtwide groundwater management with minimal labor expense, energy consumption, and wear and tear to equipment for LRNRD.

This project will not only support sustainability of water resources for wildlife, but also a variety of human uses including domestic, municipal, and industrial uses that will make communities more resilient to drought in the project area.

- *Does the project seek to improve ecological resiliency to climate change?*

Yes. Aside from water sustainability for human uses and wildlife benefits, this project will have benefits for wetlands and riparian habitat as well. Since the project seeks to conserve groundwater resources that are hydrologically linked to surface water, this project will improve ecological resiliency for wildlife habitat of waterfowl, fish, and other species that live in or near the Republican River, and its tributaries. Improved management of groundwater will conserve

water in storage in the aquifer for all uses at times of drought or other environmental conditions related to climate change. Real-time flow data supplied to the irrigators will improve on-farm irrigation management and therefore improve groundwater storage for use in times of shortage. This in turn will also support miles of riparian habitat in the area which is important for fish, waterfowl, and their habitat along streams and lake shores in the Republican River and its tributaries. Water conservation will bolster the resiliency for this ecological habitat by improving water storage in the local aquifer which will promote baseflow in streams within the Republican River basin for the benefit of wildlife and its habitat.

- *Does the proposed project seek to reduce or mitigate climate pollutions such as air or water pollution?*

Yes. Reduced pumping of groundwater will result in reduced production of greenhouse gases regardless of the energy source to pump the water. Since the energy source of the irrigation pumps is either electricity or internal combustion engines and most electricity is generated from fossil fuels, reduced pumping for irrigation will have an effect of lowering greenhouse gases in the atmosphere due to decreased use of electricity or direct use of fossil fuels.

Increased levels of Nitrate-nitrogen concentration in groundwater have been well-documented in parts of Nebraska including portions of LRNRD. Practices promoted by this project will limit leaching of nitrate-nitrogen from farm fields to the benefit of not only groundwater quantity, but also groundwater quality.

- *Does the proposed project include green or sustainable infrastructure to improve community climate resilience?*

Yes. The remote telemetry units proposed for this project have a solar-powered option that will be utilized when irrigators want or need water use data on a more frequent basis. Weather stations equipped with remote telemetry deployed under this project will also be solar-powered by 540-mA solar panels independent of commercial power to collect rainfall and other environmental data necessary.

- *Does the proposed project contribute to climate change resiliency in other ways not described above?*

Yes. Reduced pumping of groundwater will result in reduced production of greenhouse gases regardless of the energy source to pump the water. Since the energy source of the irrigation pumps is either electricity or internal combustion engines and most electricity is generated from fossil fuels, reduced pumping for irrigation will have an effect of lowering greenhouse gases in the atmosphere due to decreased use of electricity or direct use of fossil fuels.

Evaluation Criterion D—Disadvantaged Communities, Insular Areas, and Tribal

Benefits (15 points) *Up to 15 points may be awarded based on the extent that the project demonstrates support for the Biden-Harris Administration's priorities, including E.O. 14008: Tackling the Climate Crisis at Home and Abroad and the President's memorandum, Tribal Consultation and Strengthening Nation-to-Nation Relationships.*

Please address only those priorities that are applicable to your project. It is not necessary to address priorities that are not applicable to your project. A project will not necessarily receive more points simply because multiple priorities are addressed. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the priority(ies) is well supported in the application.

E.1.4.1 Subcriterion D.1. Disadvantaged Communities

E.O. 14008 affirms the advancement of environmental justice for all through the development and funding of programs to invest in disadvantaged communities. This criterion, which is used to identify projects that advance the Justice 40 Initiative, includes all Federally recognized Tribes and Tribal entities, and any disadvantaged communities in insular areas (American Samoa, Guam, the Northern Mariana Islands, or the Virgin Islands) identified pursuant to the following criteria.

- Please use the White House Council on Environmental Quality’s interactive Climate and Economic Justice Screening Tool (CEJST), available online at Explore the map Climate & Economic Justice Screening Tool (screeningtool.geoplatform.gov/en/#17.59/36.63278/-105.181329) to identify any disadvantaged communities that will benefit from your project. The CEJST developed by the White House Council on Environmental Quality is a geospatial mapping tool that utilizes publicly available, nationally consistent data sets related to climate change, the environment, health, and economic opportunity to identify disadvantaged communities. In addition to identifying specific census tracts that are disadvantaged, the CEJST includes the lands of Federally recognized Tribes as disadvantaged communities. In addition, regardless of whether a Federally recognized Tribe has land, all Federally recognized Tribal entities are considered disadvantaged communities for the purposes of the Justice40 Initiative.²

The following communities and associated census tracts are designated as Disadvantaged Communities by the Climate and Economic Justice Screening Tool and lie within LRNRD and consequently this project. This project will have a beneficial impact on the sustainability of water resources for these communities. (<https://screeningtool.geoplatform.gov>)

Project Area City, County	Census Tract
Arapahoe, Furnas County NE	31065963900
Franklin, Franklin County NE	31061964700
Red Cloud, Webster County NE	31181965100
Nelson, Nuckolls County NE	31129960000
Superior, Nuckolls County NE	31129960100

- If applicable, describe how the proposed project will serve or benefit a disadvantaged community, identified using the tool. For example, will the project improve public health and safety by addressing water quality, add new water supplies, provide economic growth opportunities, or provide other benefits in a disadvantaged community?

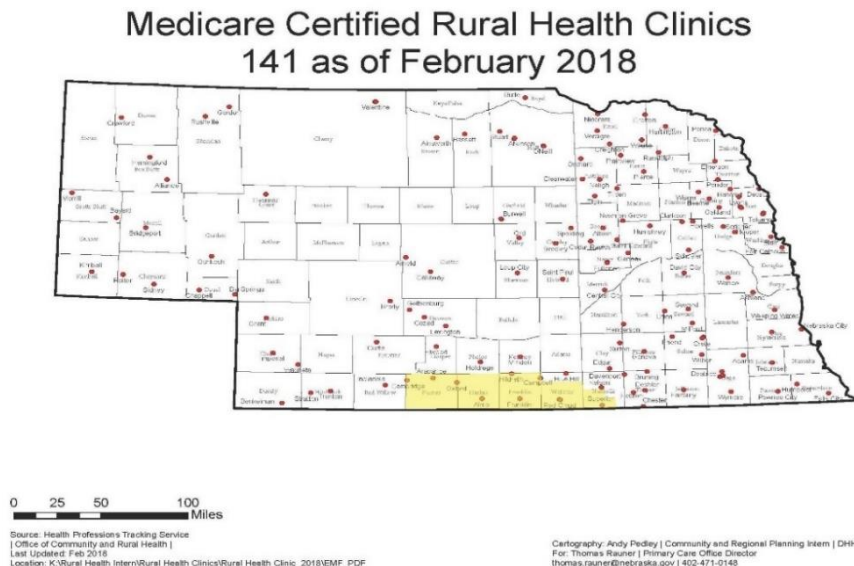
Yes. Several disadvantaged and underserved communities exist in the LRNRD. Benefits to these communities will be groundwater sustainability for all water users and beneficial uses including agriculture, municipal, industrial and domestic uses. Groundwater pumped for irrigation is the largest use of water in the LRNRD, therefore improving the efficiency of the use of groundwater will be to the benefit of all water users in the district.

In addition, 2022 data from the U.S. Census Bureau reports that the annual median household income for the State of Nebraska is **\$71,722**. The median annual income from for all five project area counties in the LRNRD is less than the statewide annual median household level as shown in the table below:

LRNRD County	2022 Median Household Income
Franklin County, NE	\$55,625
Furnas County, NE	\$58,895
Harlan County, NE	\$64,583
Nuckolls County, NE	\$66,000
Webster County, NE	\$62,571

Consequently, the project area meets the criteria for a disadvantaged community as defined by Section 1015 of the Cooperative Watershed Act. (<https://data.census.gov>)

The State of Nebraska Department of Health and Human Services has designated medical facilities for underserved communities in the state. Medicare-certified rural health clinics are created to serve rural underserved areas with affordable and accessible primary health care services. **Nine** communities in the LRNRD including **Cambridge, Arapahoe, Oxford, Alma, Hildreth, Franklin, Campbell, Red Cloud, and Superior** have received this designation as shown in the map below.



Improving the efficiency of the use of groundwater will be to the benefit of all water users in the district which includes these Medicare-certified rural health clinics.

E.1.4.2 Subcriterion D.2. Tribal Benefits

The Department 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. Address the following, if applicable:

- ***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. The project does not directly serve and/or benefit a tribe.

- ***Does the proposed project support Tribal led conservation and restoration priorities, and/or incorporate or benefit indigenous traditional knowledge and practices?***

No.

- ***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, increased renewable energy, or economic growth opportunities? Does the proposed project support Reclamation's Tribal trust responsibilities or a Reclamation activity with a Tribe?***

No. The project does not directly support tribal resilience to climate change and drought impacts or provide other Tribal benefits.

Evaluation Criterion E—Complementing On-Farm Irrigation Improvements (8 points)

Up to 8 points may be awarded for projects that describe in detail how they will complement on-farm irrigation improvements eligible for Natural Resources Conservation Service (NRCS) financial or technical assistance.

Note: Scoring under this criterion is based on an overall assessment of the extent to which the WaterSMART Grant project will complement ongoing or future on-farm improvements. Applicants should describe any proposal made to NRCS, or any plans to seek assistance from NRCS in the future, and how an NRCS-assisted activity would complement the WaterSMART Grant project. Financial assistance through EQIP is the most commonly used program by which NRCS helps producers implement improvements to irrigation systems, but NRCS does have additional technical or financial assistance programs that may be available. Applicants may receive maximum points under this criterion by providing the information described in the bullet points below. **Applicants are not required to have assurances of NRCS assistance by the application deadline to be awarded the maximum number of points under this sub-criterion.** Reclamation may contact applicants during the review process to gather additional information about pending applications for NRCS assistance if necessary.

If the proposed project will complement an on-farm improvement eligible for NRCS assistance, please address the following:

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.*

NRCS Environmental Quality Incentive Program (EQIP) Practices from the **449 Irrigation Water Management - Advanced Technologies** practice code will be deployed on irrigated farms in the project area by the NRCS. Specific practices that will be applied on irrigated land in the LRNRD project area will include; Variable Rate Irrigation (VRI), Soil Moisture Sensors, Rainfall Detection with Auto-stop for center-pivots, Integrated Evapotranspiration, and Variable Speed Pumping.

- *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*

LRNRD Staff have begun conversations with the NRCS Area Engineer, the local NRCS District Conservationist, and the NRCS Nebraska State Irrigation Engineer to prioritize these practices within the uplands surrounding the High Stream Depletion Factor Area. These practices will be encouraged and incentivized to landowners and operators in the project area as part of this program.

- *If available, 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.*

Practices including Variable Rate Irrigation (VRI), Soil Moisture Sensors, Rainfall Detection with Auto-Stop for center-pivots, Integrated Evapotranspiration, and Variable Speed Pumping are available to farmers in the State of Nebraska through the USDA Natural Resources Conservation Service. Funding for these practices will be pursued through this agency for irrigators to further improve on-farm irrigation water application efficiency and therefore reduce the groundwater extraction in LRNRD to improve the probability of achieving water

conservation goals set forth in the LRNRD IMP. Approximately **15%** of the LRNRD farms are estimated to implement these NRCS practices,

- *Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*

Please see attached letters of support in the section by the same name at the end of this document.

- *Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.*
 - *Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installing a pressurized pipe through Water SMART can help support on-farm irrigation practices such as drip irrigation.*
 - LRNRD chooses to answer the next question.

OR

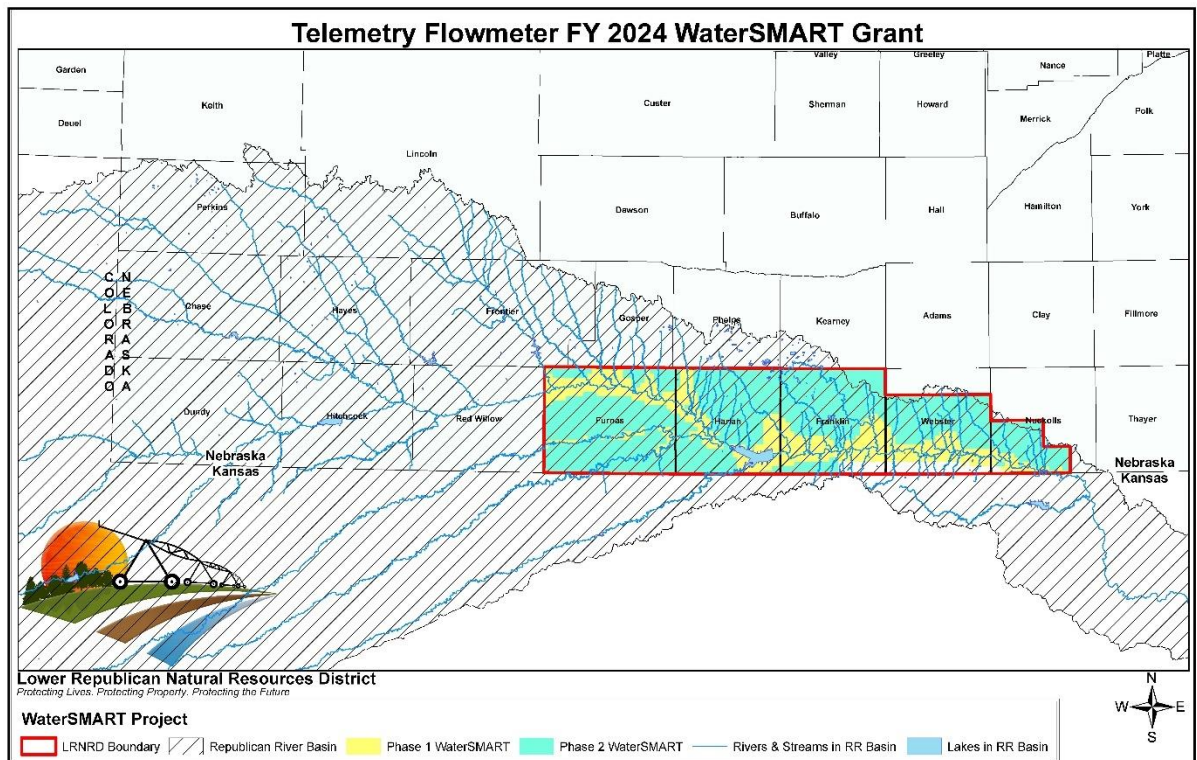
- *Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?*

Yes. The LRNRD already enforces an allocation of 45 inches/acre over 5 years or 9 inches/acre/year. The current allocation period is 2023 – 2027. In times of drought, farmers may have difficulty complying with the allocation and sometimes exceed the annual pumping allocation. Real-time access to pumping data coupled with local ET readings will better enable the irrigators to more closely match irrigation events to crop water use requirements and therefore comply with water allocations under LRNRD Rules and Regulations. In addition, the deployment of practices such as rainfall detection with automatic shut-off systems for center-pivots and variable rate technologies will further complement water savings by integrating flow data to these irrigation systems.

- *Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.*
 - *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.*

Advanced Irrigation Water Management Technologies deployed through the USDA-NRCS programs include Variable Rate Irrigation (VRI), Soil Moisture Sensors, Rainfall Detection with Auto-stop for center-pivots, Integrated Evapotranspiration, and Variable Speed Pumping. Groundwater savings will be realized with these features that will improve seasonal and application efficiency and reduce irrigation water losses on the farm to non-beneficial uses. LRNRD estimates that an additional **5%** water savings could be realized from the implementation of these advanced irrigation water management technologies. Since water pumping in the LRNRD project area was measured in 2022 at **183,290 AF**, additional water savings would be estimated at **9,164.5 AF/yr** as a result of these practices.

- *Please provide a map of your water service area boundaries. If your project is selected for funding under this funding opportunity, this information will help NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance to complement funded WaterSMART projects.*



Note: On-farm water conservation improvements that complement the water delivery improvement projects selected through this funding opportunity may be considered for NRCS funding and technical assistance to the extent that such assistance is available. For more information, including application deadlines and a description of available funding, please contact your local NRCS office. See the NRCS website for office contact information, www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/states/.

Evaluation Criterion F—Readiness to Proceed (8 points): *Up to 8 points may be awarded for these subcriteria. Points may be awarded based upon the extent to which the proposed project is capable of commencing upon entering into a financial assistance agreement. Note: If your project is selected, responses provided in this section will be used to develop the scope of work that will be included in the financial assistance agreement. 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.*

- *Identify and provide a summary description of the major tasks necessary to complete the project. Note: Do not repeat the more detailed technical project description provided in Section D.2.2.2 Application Content. This section should focus on a summary of the major tasks to be accomplished as part of the project.*

Upon the successful award of this proposal, the LRNRD will identify and prioritize wells for installation of meters with telemetry. With the help of the meter manufacturer, an installation procedure has been created for installation procedures from activities in Phase I. LRNRD plans to continue utilizing installation services provided from Phase I of this endeavor. On-going training will be essential to ensure that meters are installed to specifications and telemetry units are initialized correctly.

LRNRD will proceed with procuring the equipment necessary for this project. Totalizing flow meters will be sized according to measurements of well discharge pipes and models will be selected and purchased that will best accommodate proper installation for accurate readings.

Totalizing flow meters with remote telemetry will be purchased, and installation will begin in Fall, 2025. Installation of weather stations for local crop water use is planned to occur in Fall of 2025. Subsequent installations will be conducted in the fall and winters of 2025-26, 2026-27, and 2027-28. Following the deployment, a final report will be prepared for the Bureau by October, 2028. To achieve groundwater conservation goals, LRNRD plans to have all wells and other water management sensors in the project area equipped with telemetry before the 2029 growing season with the assistance of the proposed project.

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

No permits are required for the tasks performed under this project.

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

No structural engineering or design work is necessary for this project. Installation contractors and/or LRNRD staff will conduct site surveys of individual meter installation sites to ensure proper meter installation and accuracy. No excavation or construction is necessary for this project.

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

No new policies, rules & regulations, or other administrative action is necessary for this project. The 5th generation Integrated Management Plan (IMP) was adopted by the LRNRD on 9/27/21 in addition to updated District Rules and Regulations, effective 1/1/2023, which included remote read meter standards and requirements. Those documents will be the guidance for the district and this proposal.

- *Describe the current design status of the project. If additional design work is required prior to construction, describe the planned process and timeline for completing the design work.*

The project equipment design for meter/telemetry implementation is based on the configuration used in Phase 1 and updated for Phase 2. The equipment design template consists of a flow meter, telemetry antenna, and the data management system.

- *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). Was the expected timeline for environmental and cultural compliance discussed with the local Reclamation regional or area office?*

February 22, 2024: Submit Application to Bureau

December 31, 2024: Successful notification of award from the Bureau

April, 2025: Sign contract with the Bureau

July, 2025: Achieve Environmental and cultural compliance from the Bureau

October, 2025 - March, 2026: Install approximately 600 telemetry-equipped flowmeters

April, 2026: Installation of weather stations for local crop water use

October, 2026 - March, 2027: Install approximately 600 telemetry-equipped flowmeters

October, 2027 - March, 2028: Install approximately 600 telemetry-equipped flowmeters

October, 2028: - Prepare Final Project Report for Bureau

Evaluation Criterion G—Collaboration (5 points): *Up to 5 points may be awarded for projects that promote and encourage collaboration among parties in a way that helps increase the sustainability of the water supply.* Please describe how the project promotes and encourages collaboration. Consider the following:

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

• 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?

Yes, remote telemetry to improve irrigation water management has become very popular in the LRNRD over the past four years with the initial telemetry sites installed to create the data collections system in the NRD and in the neighboring district. Many discussions have taken place with the eleven-member LRNRD Board. They have individually voiced support and intent to vote to approve the resolution to pursue this grant proposal. The resolution was passed at the **January 11, 2024** Board Meeting and a copy of the resolution is attached. In addition, this project has gained the support of the Nebraska Department of Natural Resources and both the Frenchman-Cambridge and Bostwick Irrigation Districts.

• What is the significance of the collaboration/support?

This project represents a cooperative effort between the LRNRD, the Nebraska Department of Natural Resources (NDNR), and McCrometer Corporation, with assistance from the Bureau of Reclamation. The irrigation water management of several hundred farmers will be positively affected by this partnership. Similarly, the basin wide water management within the Republican River Valley will be improved by assisting the LRNRD and the State of Nebraska to comply with the **Interstate Compact on the Republican River** with the States of Kansas and Colorado. This collaboration will result in one of the first regional water management data networks in the country.

Information on depletions to stream flow caused by groundwater use for Republican River Compact accounting purposes will be available much sooner than is now possible because groundwater use, via the telemetry units on flow meters, will be available almost instantaneously. Beneficial agreements reached recently among the compact states allow Nebraska to provide volumes of water to Kansas based on actual, instead of projected, water use and water supplies. Because the projections are naturally very liberal to ensure compliance, providing actual instead of projected volumes needed to maintain compliance is expected to reduce, possibly significant, amounts of water that must be produced to maintain compliance. Near real-time acquisition of water use data will aid District and State efforts to calculate actual Compact Compliance needs.

One objective of the LRNRD Integrated Management Plan (IMP) that would assist in long-term Compact compliance is reducing existing groundwater use within the District by **20 percent** from the 1998 to 2002 baseline pumping volumes. When combined with streamflow

augmentation and incentive programs, LRNRD's groundwater depletions to the Republican River can be maintained within Nebraska's portion of allowable groundwater depletions as computed through use of the Republican River Compact Administration Groundwater Model. Through our IMP, we also have committed to reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use. This voluntary project will allow producers to take their water management to a higher level and contribute to the 20% reduction. Goals and Objectives for the LRNRD IMP can be found in Appendix A.

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

Yes. This innovative project will affect a very large portion of the Republican River Basin. The successful implementation and completion of this project will have the potential to be replicated in other water management districts in the Republican River Basin, other portions of Nebraska, as well as other states.

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

Yes, Water conserved due to reduced groundwater pumping will remain in the local aquifer to maintain groundwater levels for other uses including municipal, industrial, and domestic as well as improve baseflow for surface water uses in the basin.

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

Letters of Support from local landowners and future participants can be found in a section with the same name at the end of this document. See attached **Letters of Commitment / Participation** at the end of this document from McCrometer for irrigation equipment, field service, and remote technology and the Nebraska DNR for financial support of this project.

Evaluation Criterion H— Nexus to Reclamation (4 Points): *Up to 4 points may be awarded if the proposed project is connected to a Reclamation project or Reclamation activity. No points will be awarded for proposals without 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:

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

No. However, the proposed project is in the Republican River Basin as are many Reclamation Projects:

Enders Reservoir, which has historically served Frenchman Valley Irrigation District. Swanson Reservoir, serving Frenchman-Cambridge Irrigation District
Hugh Butler Lake, serving Frenchman-Cambridge Irrigation District
Harry Strunk Lake, serving Frenchman-Cambridge Irrigation District
Harlan County Lake, serving Nebraska Bostwick and Kansas Bostwick Irrigation Districts

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

The LRNRD does not receive Reclamation water and is not on Reclamation lands. To the extent that reduced groundwater extraction within the project area will increase baseflow in the Republican River, it will contribute water to Reclamation projects.

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

Yes. Harlan County Lake is within project area and consequently will receive benefits from this project for the water users that these Reclamation projects serve through improved baseflow due to reduced groundwater pumping. Frenchman Creek is a major tributary to the Republican River and downstream of the confluence of the Frenchman and Republican multiple canals which are part of Reclamation projects exist. Canals include: Meeker, Bartley, Cambridge, Naponee, Franklin, and Superior within Nebraska along the Republican River. Reduced groundwater pumping under this project will have a positive impact on the baseflow in the Republican River since alluvial aquifers provide discharge to the Republican River Basin for baseflow in the Republican River.

• Is the applicant a Tribe?

No.

PERFORMANCE MEASURES

Performance Measure A.2: Measuring Devices: Good water management requires accurate and timely water measurement at appropriate locations throughout a conveyance system. This includes irrigation delivery systems and municipal distribution systems.

Measuring Devices: A.2.b. Irrigation Metering: Measuring devices that may be installed can include, but is not limited to, the following:

Flow meters: Water Conservation will be achieved and quantified with the installation of permanently installed irrigation flow meters with telemetry. A key metric of this proposal will be the objective to install **1,800** metered telemetry stations on large capacity irrigation wells in LRNRD.

Potential benefits from improved irrigation delivery system measurement include being able to:

• Facilitate accurate and equitable distribution of water within a district

For an allocation program to work, accurate measurement of water pumped is necessary to ensure compliance with pumping allocations and to facilitate equitable distribution among users. Permanently installed totalizing flow meters with telemetry will facilitate accurate and equitable water marketing in LRNRD under this proposal.

Pre-project estimations of baseline data:

All groundwater extractions have been metered in LRNRD pursuant to groundwater management regulations. As a result, this will provide for an accurate baseline of past water use for evaluation of water savings due to the installation of meters with real-time telemetry.

Post-project methods for quantifying the benefits of projects to install measuring devices:

- *Compare post-project water measurement (deliveries, diversions, and waste/spills) data to pre-project data or estimates—taking into account other factors which may have caused changes*

Groundwater for irrigation pumped within the project area will continue to be measured and comparisons will be made between pre and post project pumping records within the project area to gauge water savings.

Performance Measure A.3: SCADA: *SCADA systems provide water managers with real-time data on the flow rates and volumes of water at key points within an irrigation water delivery system.*

The projected opportunities for improved operational efficiencies that could be realized through implementation of a SCADA or SCADA/GIS system (e.g., improved delivery equity, improved response to unanticipated events, reduced administrative spillage, and enhanced productivity of human resources)

- Real-time water use data will be available to farmers on **224,425** irrigated acres for improved water management. This will assist farmers in meeting LRNRD allocations for groundwater conservation.
- Real-time water use will also be available to LRNRD for Compact Compliance for the **Interstate Compact** with Kansas and Colorado on the Republican River.

Pre-project estimations of baseline data:

- *Collect data on diversions and deliveries to water users*

Collection of groundwater pumping data prior to this project was done manually. This required LRNRD district staff to physically drive to each well site to manually record pumping data which was extremely labor intensive.

Post-project methods for quantifying benefits of SCADA or SCADA/GIS system projects:

- *Track and record the diversions to water users and compare to pre-project diversions. This would show results of improved management if yearly fluctuations in weather are accounted for.*

Upon the successful completion of this project, pumping data will be supplied to irrigators and LRNRD water managers daily. This frequent data will enable farmers to improve seasonal irrigation efficiency (timing irrigation events throughout the season) and aid basin-wide water management by delivering daily water use data to LRNRD water managers.

Project Budget

Funding Plan

The non-federal cost share required for the project has been appropriated in expectation of pursuing this project and is available to the LRNRD. Third-party funding in the amount of **\$2,580,000** will be contributed by the Nebraska Department of Natural Resources (NDNR) to contribute to the Remote Metering Program (see attached letter of commitment) upon the successful award of this proposal. Other non-federal funding will be provided solely by the LRNRD. The LRNRD currently has and will budget over the three-year duration of the project a cash balance sufficient to pay for the non-federal portion of the project.

The LRNRD does not seek to include any in-kind costs incurred before the project start date. Letters of support and participation from project partners are attached. No funding requests are pending that have not been approved. The funding commitment from the LRNRD is **\$1,753,250**. The LRNRD board has committed to budget these funds over the three-year span of this grant proposal. No contingencies are associated with the funding commitment.

The LRNRD 's contribution to the cost-share requirement will be monetary. Funds expended by LRNRD will be used to purchase remote meter telemetry equipment, miscellaneous equipment for installation, data costs, software/dashboard development, and contractor services for installation. Grant funds from the Bureau would be used for the same expenses. The remaining balance of **\$4,333,250** is requested of the Bureau of Reclamation in this **\$8,666,500** proposal. No other federal sources of funds have been requested. No pending funding requests would negatively affect the project if not approved. **Letters of Commitment/Partnership** from project partners are attached at the end of this document. **Letters of Support** can also be found at the end of this document.

Budget Proposal

Funding Sources	% of Total Cost	Total Cost by Source
Bureau of Reclamation	50%	\$4,333,250
Lower Republican NRD (LRNRD)	20%	\$1,753,250
Nebraska Dept of Natural Resources (NDNR)	30%	\$2,580,000
Totals	100.00%	\$8,666,500

Budget Item Description	Computation \$/unit	Quantity	Quantity Type (hours/days)	Total Cost
Salaries and Wages				
	No federal funds to be used for salaries/wages			
Fringe Benefits				
	No fringe benefits provided by this project			
Travel				
	No federal funds to be used for travel			
Environmental Compliance Costs				
				\$ 500.00
Equipment				
Flow Meter Telemetry Stations	\$4,100.00	1800	ea	\$7,380,000
Subtotal				\$7,380,000
Supplies and Materials				
Weather Stations	\$ 8,000.00	8	ea	\$64,000
Installation Materials	\$ 150.00	600	ea	\$90,000
Subtotal				\$154,000
Contractual/Construction				
Flow Meter Telemetry Site Assessment/Installation	\$500.00	1800	ea	\$900,000
Data Acquisition/Processing	\$50.00	600	Yr 1	\$30,000
Data Acquisition/Processing	\$50.00	1200	Yr 2	\$60,000
Data Acquisition/Processing	\$50.00	1800	Yr 3	\$90,000
Software/Dashboard Database Development	\$ 13,000.00	4		\$52,000
Subtotal				\$1,132,000
Total Project Costs				
				\$8,666,500

Budget Narrative

As indicated in Table 2, the only costs for which the LRNRD is seeking reimbursement are the costs of the equipment and supplies associated with the project, contract services to install the telemetry equipment, and telemetry data costs in the first three years of the project. No salaries, wages, or travel costs are included. LRNRD staff will administer the project tasks

including landowner communication, site selection, and contractor management. No in-kind services by the district are contributing to federal funds requested representing an **additional** contribution not reflected in the budget proposal. No reimbursement for fringe benefits or travel will be sought and are not included as project costs.

The equipment costs listed in Table 2 are the result of pricing the LRNRD has received for telemetry equipment required for accessing meters. For first phase of the LRNRD Remote Metering Project, McCrometer has been able to certify that it meets requirements of the Build America, Buy America provisions of the Infrastructure Investment and Jobs Act (“the Act”) Pub. L. No. 117-58 as outlined for manufactured products including the meter and telemetry product bundle supplied to LRNRD. Pricing included in the budget above reflects the costs necessary to meet these requirements.

All equipment will be installed under a contract by an installer experienced in this work. The \$500/site installation and site assessment charge may include two trips to the meter installation site. One for measurements to ensure proper installation and the second to install the meter with telemetry equipment and flow conditioning devices. This cost has been compared with other similar service providers and was determined to be reasonable. The line items for data acquisition and processing are the data acquisition costs incurred during the duration of the project to install 1,800 meter telemetry units (600 in the first year, 1,200 in the second year, and 1,800 in the third year for a total 3,600 data fees over the three year period).

The environmental and regulatory compliance costs of \$500 listed in the budget table are minimal because the project primarily entails upgrading existing equipment, flow meters, that are currently in compliance with environmental regulations. If environmental and regulatory costs exceed the budgeted amount, the LRNRD, as may already be required, will pay additional and necessary amounts. Total project costs are **\$8,666,500**. The LRNRD will be responsible for **20%**, the NDNR will contribute **30%** and the Bureau is requested to contribute **50%**.

Environmental and Cultural Resources Compliance

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with each application, all applicants must respond to the following list of questions focusing on the NEPA, ESA, and NHPA requirements. Please answer the following questions to the best of your knowledge. If any question is not applicable to the project, please explain why. The application should include the answers to:

- ***Will the proposed project impact the surrounding environment?***

No. No earth-disturbing work affecting water, animals, or water will be done.

- ***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?***

No, only occasional migratory species including Whooping Cranes or Sandhill Cranes reside in the project area. Neither these species nor their habitat will be affected by the work in this project.

- *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 none will be impacted as no project equipment will be installed on such lands.

- *When was the water delivery system constructed?*

The water delivery system consists of privately-owned groundwater wells constructed from the 1950’s through the early 2000’s.

- *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?*

No.

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

No. This project may assist them by sustaining the agricultural economy in the region.

- *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.

Required Permits or Approvals

No permits will be required of the LRNRD for this project.

Overlap or Duplication of Effort Statement

LRNRD does not have any project that overlap or duplicate the effort of the proposed project in terms of activities, costs, or commitment of key personnel. The proposed project has not been or will be submitted for consideration to any other potential funding source – whether it be federal or non-federal.

Conflict of Interest Disclosure Statement

LRNRD does not have any actual or potential conflict of interest at the time of submission, not do we anticipate having any conflict of interest during the federal award period.

Applicability

LRNRD will take the appropriate steps to avoid conflicts of interest in its responsibilities under or in respect to Federal financial assistance agreements. The procurement of supplies, equipment, construction, and services by recipients and by subrecipients shall be in accordance with the provisions of 2 CFR§200.318.

Notification

LRNRD will disclose in writing any conflict of interest to Reclamation. LRNRD will establish internal controls that include procedures to identify, disclose, and mitigate or eliminate identified conflicts of interest.

Restrictions on Lobbying

LRNRD will not use funds under a grant or cooperative agreement for lobbying activities and will provide the required certifications and disclosures.

Review Procedures

LRNRD will resolve any conflict of interest if determined by the Financial Assistance Officer.

Uniform Audit Reporting Statement

LRNRD was a recipient of a federal FY'22 Water SMART grant under FOA# 22AS00023 for \$2,000,000. At this time, approximately \$575,000 of these funds have been expended and was consequently not required to submit a Single Audit report for fiscal year 2023.

Certification Regarding Lobbying

LRNRD is requesting more than \$100,000 in federal funding and is certifying as such in Form SF-424 which is attached to this application.

Disclosure of Lobbying Activities

A copy of a fully completed and signed SF-LLL is attached to this application.

References

Irmak, S. Brar, D. Kukal, M. S. Odhiambo, L. Djaman, K, 2022. Automated real-time irrigation analytics inform diversity in regional irrigator behavior and water withdrawal and use characteristics. *AGRICULTURAL WATER MANAGEMENT*, 272 (2022) 107837

Kranz, W. L. Eisenhauer, D. E., Retka, M. T., 1992. Water and energy conservation using irrigation scheduling with center-pivot irrigation systems. *AGRICULTURAL WATER MANAGEMENT*, 22 (1992) 325-334

McGuire, V.L., 2017. Water Level changes in the High Plains aquifer, Republican River Basin in Colorado, Kansas, and Nebraska, 2002 to 2015 (ver. 1.2, March 2017): U.S. Geological Survey Scientific Investigations Map 3373, 10p., 1 sheet with appendix, <https://doi.org/10.3133/sim3373>.

Young, A.R., Burbach, M. E., Howard, L. M., Lackey, S.O., Joeckel, R.M., 2019 Nebraska Statewide Groundwater-Level Monitoring Report 2019. University of Nebraska-Lincoln, Conservation and Survey Division, Nebraska Water Survey Paper 87, 24 pp.

Official Resolution

RESOLUTION OF THE LOWER REPUBLICAN NATURAL RESOURCES DISTRICT

Resolution No. LR-01112024

WHEREAS, the Board of Directors agrees that Nick Simonson, Assistant General Manager of the Lower Republican Natural Resources District (LRNRD), has legal authority to enter into an agreement with the U.S. Bureau of Reclamation to execute provisions of the WaterSMART Water and Energy Efficiency Grant (WEEG) program; and

WHEREAS, the Assistant General Manager may delegate his authority to act on behalf of the LRNRD in regards to the WaterSMART WEEG program to a member of the staff and such delegation shall serve to authorize this person to act in the same capacity as the Assistant General Manager, which shall include signing all necessary paperwork; and

WHEREAS, Management of the LRNRD has reviewed and supports the application for WaterSMART Grant funds; and

WHEREAS, the LRNRD is a political subdivision of the State of Nebraska and as such has taxing authorities and current budgetary capabilities sufficient to provide the amount of funding specified in the WaterSMART Grant application funding plan; and

WHEREAS, the LRNRD agrees to work with the U.S. Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

NOW, THEREFORE, be it resolved, that the Lower Republican Natural Resources District Board of Directors authorizes Management of the District to meet legal and financial obligations required under the U.S. Bureau of Reclamation's WaterSMART Water and Energy Efficiency Grant Program.



Marlin Murdoch, Board Chairman

1/11/2024
Date Approved

Letters of Commitment/Participation

NEBRASKA

Good Life. Great Water.

DEPT. OF NATURAL RESOURCES

February 16, 2024

Mr. Todd Siel, General Manager
Lower Republican Natural Resources District
30 North John Street
PO Box 618
Alma, NE 68920



Jim Pillen, Governor

Dear Todd:

Please consider this message a formal Letter of Commitment from the Nebraska Department of Natural Resources (NeDNR) to provide up to \$2,580,000 in matching state funds upon approval of your Bureau of Reclamation WaterSMART grant application for the Irrigation Water Conservation using Telemetry Meter Technology and Connected Database and Application Project, under the WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2024 program (R24AS00052). Projects like these can provide multiple benefits across the basin, including improved producer water application decisions, reductions in pumping and consumptive use, and improvements in implementing future water management activities. These efforts are also expected to be complimentary toward implementation of the Integrated Management Plan (IMP) for the Lower Republican Natural Resources District (LRNRD) and the Republican River Basin-Wide Plan.

Matching State funds from NeDNR will be available to the applicant upon successful award of the WaterSMART grant application, as the funds are currently included within the agency budget. NeDNR staff look forward to working with your district to implement this financial commitment, pending approval of your WaterSMART grant application. Once again, NeDNR fully supports your district's water management goals and appreciates your ongoing efforts to implement our joint IMP and Basin-Wide Plan.

Sincerely,

Thomas E. Riley, P.E., Director

Thomas E. Riley, P.E., Director

Department of Natural Resources

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February 20, 2024

Lower Republican NRD
Attn: Nick Simonson, Assistant General Manager
30 North John Street
Alma, NE 68920

Re: Bureau of Reclamation Water Smart Application; FY 2024 Water and Energy Efficiency Grant

Dear Mr. Simonson:

McCrometer is glad to be a partner in the project titled "**Irrigation Water Conservation for the Upland Area of the Republican River using Remote Meter Reading Technology**". McCrometer will commit to supplying meters and telemetry equipment, technical support, and field service upon the successful award of this grant proposal.

McCrometer has provided durable and accurate flow measurement devices for the agricultural irrigation industry for over 65 years. This project will support agriculture, improved water management for groundwater preservation, and local communities in the Republican River Basin.

McCrometer applauds the Bureau of Reclamation for the recognition of practices that will enhance irrigation water management in the industry of agriculture by supporting projects through the Water Smart Program and strongly encourages the approval of this proposal.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Kenneth A. Quandt".

Kenneth A Quandt
Regulatory Development Manager, Agriculture
McCrometer, Inc.

Letters of Support

February 5, 2024

To the Board of the Lower Republican NRD:

This is a letter of support for the Lower Republican Natural Resource District's application for telemetry meters on my irrigation systems and throughout the district. As a farmer in the district, I am fully aware of the need to provide farmers with every advantage possible to conserve and protect our irrigation water. While the work the producers have done in the district since the enactment of allocations is remarkable, we need to continue to utilize all the resources and technologies available to ensure we continue to be good stewards of the land and water.

I am very pleased with the meters that were installed on my farm through the first phase of the grant. I am looking forward to the meters being installed on a larger scale across the district so everyone can experience this new technology and start to understand how it will benefit management decisions on their farms in the future. This will also save time by allowing me to see how much water is being applied and that the system is operating at the correct gallons per minute.

Assistance from the NRD is needed for the applications that will be developed to provide producers with daily access to their water use reports. Not only will this help us to be more efficient and profitable on our own operations, but it will also help to ensure that we are meeting our obligations to the other states in the Republican River Compact.

Efforts such as these will help to ensure the farmers in the Republican River Valley can help protect our groundwater and feed the world for generations to come.

Sincerely,



Alan Christensen
Alma, Nebraska

MURDOCH PARTNERSHIP

Marlin Murdoch, General Partner
Duane Murdoch, General Partner

February 8, 2024

Lower Republican NRD
Attn: Todd Siel, General Manager
PO Box 618
30 John Street
Alma, NE 68920

Re: Bureau of Reclamation Water Smart Grant Application; **"Irrigation Water Conservation for the Upland Area of the Republican River using Remote Meter Reading Technology"**

Dear Mr. Siel:

This is a letter of support for the Lower Republican Natural Resource District's (LRNRD)'s grant application for metering with real-time telemetry and water use reporting. As a farmer in the district as well as a board member for the LRNRD, I am intimately aware of the need to provide our growers every advantage possible to conserve and protect our water. While the work the producers have done in the district since the enactment of allocations is amazing, we need to continue to utilize all the resources and technologies available to ensure we continue to be good stewards of the land and water.

I was very pleased with the meters that were installed on my farms to this point. The meters functioned as expected and will definitely help us to make better decisions about our irrigation use in the future. I am very excited for the meters to be installed on a larger scale across the district so our producers can experience this new technology and start to understand how it will benefit management decisions on their farms in the future.

Assistance from the NRD is needed for the applications that will be developed to provide producers with daily access to their water use reports. Not only will this help us to be more efficient and profitable on our own operations, but it will also help to ensure that we are meeting our compliance obligations to the other states in the Republican River Compact.

I appreciate the staff and other board members supporting this project. Efforts such as these will help to ensure the farmers in the Republican River Valley can help feed the world for generations to come.

Sincerely,



Murdoch Partnership
Marlin Murdoch
Oxford, NE