Phase II of the Remote Irrigation Meter and Irrigation Water Conservation Project for the Upland Decline Area

in the

Middle Republican Natural Resources District

WaterSMART Water and Energy Efficiency Grant

Grant Application FOA# BOR-DO-21-F001

Funding Group II

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Executive Summary

Date: September 17, 2020

Applicant: Middle Republican Natural Resources District (MRNRD), Curtis, Frontier County, Nebraska.

Project Summary

The MRNRD is proposing Phase II of an innovative real-time operational irrigation water management model for groundwater irrigated acres in the upland areas where groundwater declines exist in this Southwest Nebraska NRD that will track water supply and demand conditions. Upon the successful award of this proposal, the MRNRD will utilize funds from the District, the State of Nebraska, and the Bureau to deploy near real-time telemetry equipment on **966** 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 have been 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 water conservation further incentivized through NRCS programs in the district and reduce or reverse the decline of groundwater in the northwestern region of the MRNRD. The availability of real-time water use data to the MRNRD will also improve management of water on a basin-wide scale.

This project is expected to last three years, beginning in the winter of 2021-2022 and ending in 2024. This project is not located on a federal facility and the MRNRD does not receive water from Bureau projects.

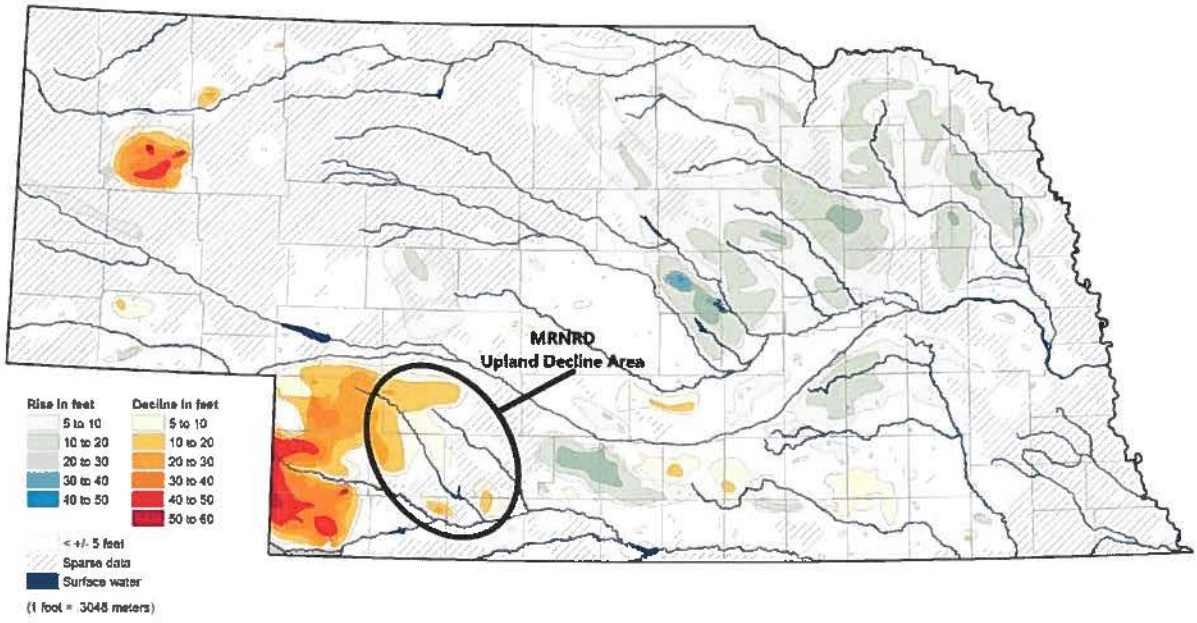
Background Data

This project is intended to reduce groundwater irrigation applications and increase long term groundwater and surface water availability in a region of Nebraska where significant conflict between water users exist. The MRNRD is in the heart 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 by providing irrigators and the MRNRD timely water use information that will improve water management decisions by both irrigators and the MRNRD.

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. The MRNRD began its mandatory metering program in 2000 and was complete by 2004. The district manages groundwater extractions pursuant to state statute for 297,010 acres irrigated by 2,813 groundwater wells. The MRNRD currently enforces groundwater pumping allocations of 12 inches per acre on all of these acres per year over a five-year period. Consequently, the allocation for MRNRD groundwater irrigators is 60 inches per acre over a five-year period. This allocation began in 2005.

MRNRD 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. The area-weighted, average water-level change from 2002 to 2015 in this part of the aquifer was a decline of 4.5 feet. 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. Water levels declined 3 ft or more in 68 percent of the measured wells and declined 5 ft or more in 60 percent of the measured wells. (McGuire, V.L. 2017)

Figure 16. Groundwater-Level Changes in Nebraska - Spring 1981 to Spring 2019



Sources: U.S. Geological Survey, Nebraska Water Science Center; U.S. Bureau of Reclamation, Kansas-Nebraska Area Office; Nebraska Natural Resources Districts; Central Nebraska Public Power and Irrigation District

The University of Nebraska-Lincoln Conservation Survey Division's annual report has also documented significant groundwater declines in the Republican River Basin as noted in the above map. This report has identified groundwater declines between 10 and 30 feet in the

upland areas designated for this project since 1981. Outside of four other counties in the state, these are some of the greatest regional declines in the State of Nebraska over the same time period. Static water levels in this area are commonly 150 – 200 feet below ground surface with saturated thickness of approximately 150 - 225 feet. The groundwater declines in this portion of the MRNRD over the last thirty-five years could easily represent a loss 10 – 20% of the saturated thickness of the regional aquifer. The MRNRD intends to implement this innovative and proactive program that will have the potential of slowing or reversing these groundwater declines in the Middle Republican NRD through improved irrigation water management.

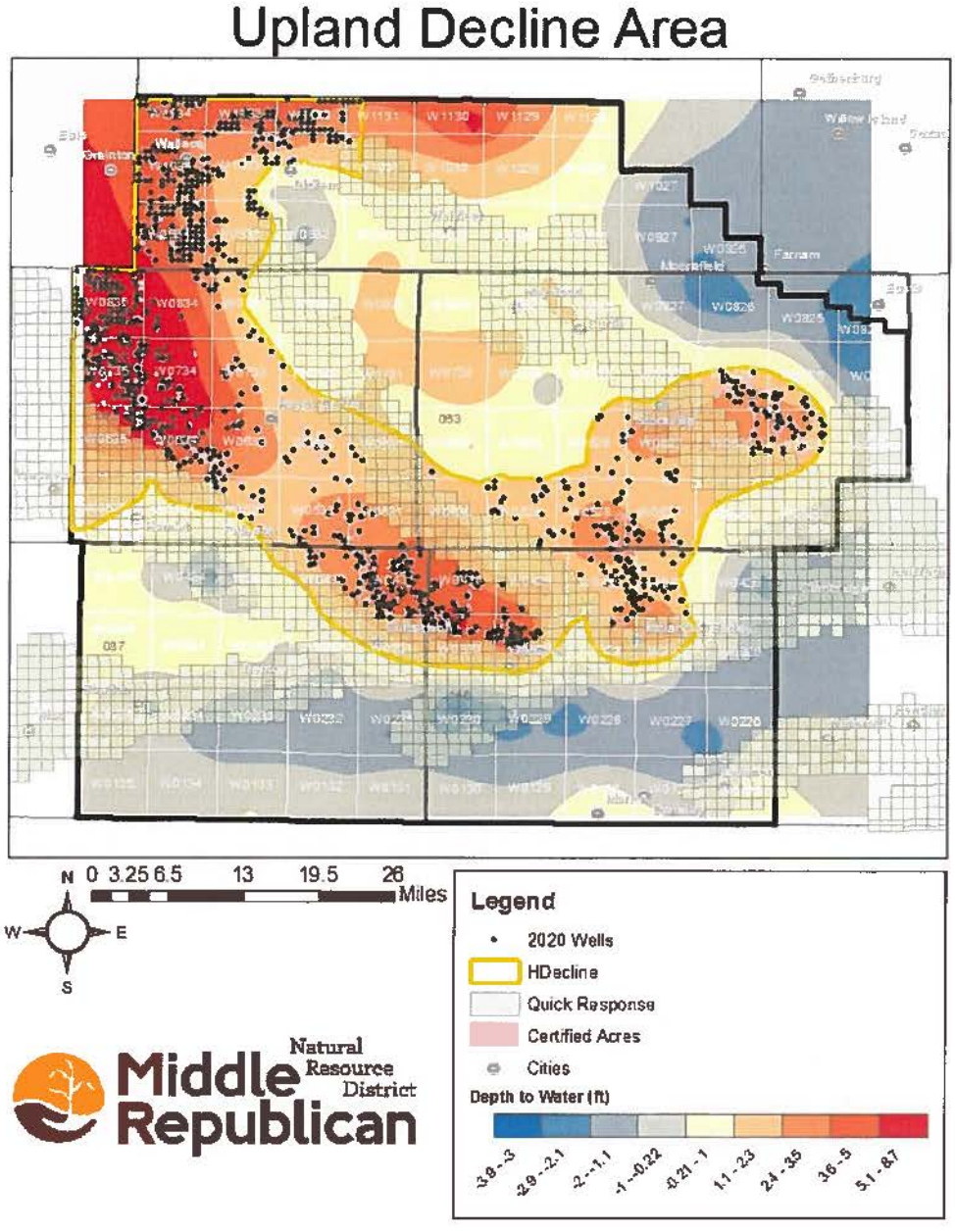
In 2016 the MRNRD received funding from the Nebraska Department of Natural Resources (NDNR) Water Sustainability Fund to implement the "High-Tech Irrigation Project". This highly successful project deployed remote telemetry on flow meters and soil moisture probes in forty-nine irrigated fields within the MRNRD for improved irrigation water management. Based on actual metered pumping records in 2019, the MRNRD estimates that **0.94 inches** of water were saved per acre per year on these fields over the past year due to improved management. In December of 2018, the MRNRD was awarded $250,000 from the NDNR to for the second installment of this program. This program will be promoted to farmers in the project area to implement the practice of soil moisture monitoring with remote telemetry.

Because of the water savings experienced and wide-spread acceptance of remote technology aiding irrigation management, the MRNRD proposes with this application to expand remote meter-reading technology into upland areas of the MRNRD by upgrading **966 meters** with FlowConnect™ technology from McCrometer. The wells in this project area cover **119,996 irrigated acres** in the district. MRNRD has already deployed, in the previously funded Reclamation project, eight weather stations 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.

The MRNRD has good history of cooperating with the Bureau of Reclamation by recently completing a grant project entitled "*Red Willow Creek Basin Model Part2*, Agreement #R17AP00330". The district also cooperated with the Bureau in the *Republican River Basin Study* published in March, 2016. MRNRD 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 MRNRD was also awarded a Water and Energy Efficiency Grant in 2019 entitled "*Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District*". The proposed project represents Phase II of MRNRD's initiative to upgrade all irrigation flow meters in the district with remote telemetry for enhanced irrigation and groundwater management.

Project Location

The MRNRD is located in southwest Nebraska and headquartered in Curtis, NE. The district includes all or parts of Red Willow, Hitchcock, Hayes, Frontier, and Lincoln Counties. The project area is outlined in yellow as shown on the following map and includes parts of each of these counties referred to as the Upland Declined Area of the MRNRD in southwestern Nebraska. Groundwater declines are also represented in the timeframe from 2008 through 2018.



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 MRNRD creating a real-time operational model to evaluate current pumping allocations and guide decisions regarding future allocations.

MRNRD has required flowmeters on all irrigation wells in the district since 2000. **2,813** irrigation wells currently exist in the district, **966** of which are in Upland Decline Area of the district. This area represents the most densely irrigated portion of the MRNRD and the area of greatest groundwater declines in the local aquifer. This project will deploy FlowConnect™ telemetry technology on **966 irrigation flow meters** improving the irrigation management on **119,996 acres** in the MRNRD. The predominant irrigation flow meter in the district is the mechanical McCrometer propeller meter. FlowConnect™ 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. FlowConnect's ExactRead technology, made possible with the digital register option, 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.

Weather stations for local crop water use have been deployed throughout the district in conjunction with the previous 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.

Contractors proficient in meter installation and remote telemetry have been selected from work done on a previous irrigation telemetry project within the district. 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 30 points may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency by modernizing existing infrastructure. 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.

Water Savings

Describe the amount of estimated water savings. ***For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.***

The MRNRD estimates that approximately **5,170 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 Decline Area of the MRNRD. 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.

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).

Describe current losses: Please explain where the water that will be conserved is currently going (e.g., back to the stream, spilled at the end of the ditch, 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. The deployment of real-time telemetry devices on irrigation flow meters, weather stations, and soil moisture probes 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 Upland Decline Area averages just over 89,000 AF/yr. If irrigation systems operated at 15% efficiency, operational losses would be over 13,000 AF/yr.

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. MRNRD estimates that approximately **5,170 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 **40% reduction** in operational losses.

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.***

Application Efficiency

After the 2019 growing season a comparison was made between the water pumped on the fields enrolled in the High-Tech Irrigation Management Project and surrounding fields (of similar crop type and irrigation method) that were not enrolled in the program. Each field in the High-Tech program had real-time telemetry on the irrigation flow meters for water application and soil probes for soil moisture monitoring. Six fields enrolled in the High-Tech Irrigation Project were randomly selected and the water use from the meters on these fields was recorded. A circle was drawn around each field that represented 36 square miles or roughly one township. **One Hundred Thirty-Eight** fields were selected from within these six circles to compare water use on the fields with telemetry-aided irrigation management to fields without telemetry (control). All fields within each circle were the same crop (corn) and the same type of irrigation system (center pivot). Each High-Tech program field was compared to no-less-than ten non-program (control) fields. The differences in water applications are represented in the following table.

Field #	Change in Water Applied (in/ac)
Field 1	0.93
Field 2	-1.83
Field 3	-4.51
Field 4	2.02
Field 5	0.09
Field 6	-4.36
Average Reduction	**-1.28**

The average water application rates of all High-Tech fields were further compared to the average water application rates of all non-program (control) fields. The average water application rate of all High-Tech fields was **6.46** inches/ac while the average of all control fields was **7.40** inches/ac. Consequently, the MRNRD considers a reasonable and conservative average water savings to be **0.94 inches/ac** for fields utilizing real-time telemetry for irrigation water metering and soil-moisture monitoring.

This proposal will implement only real-time data acquisition from irrigation flow meters for water application and of local crop water use for irrigation scheduling on the acres in the Upland Decline Area. As a result, the district considers a reasonable water savings to be **0.47 inches/ac** in the project area, or half of the water savings experienced in the High-Tech Program where soil moisture monitoring was deployed. These practices will be implemented on **119,996 acres** of the upland decline area. Additionally, **10%** of these fields are expected to enroll in Phase 2 of the High-Tech Irrigation Program beginning in 2021. These fields would represent **12,000 acres** total). The expected water savings would be **0.94 inches/ac** on these fields. The calculations for water savings due to this project are as follows:

Acres utilizing only real-time metering and crop water use:

(107,996 ac) x (0.47 in) = 50,758 ac-in = **4,230 AF**

High-Tech Phase 2 acres utilizing real-time metering, soil-moisture, and crop water use:

(12,000 ac) x (0.94 in) = 11,280 ac-in = **940 AF**

Total Estimated Annual Water Savings (Conservation): **5,170 AF/year**

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.

Improved Application Efficiency

Conservative estimates of **0.47** inches/acre are projected on irrigated acres in the project area utilizing real-time water application and crop water use for irrigation scheduling. An additional **0.47** inches/acre is projected to be conserved on acres that utilize soil moisture monitoring coupled with real-time water application and crop water use data. The total irrigated acres in the Upland Decline Area is **119,996 acres**. The following water savings calculations are based on saving **0.47** inches/acre on **90%**, or **107,996 acres**, totaling **4,230 AF**. The remaining **10%**, or **12,000**, of these acres are projected to deploy telemetry-aided soil moisture monitoring, irrigation water application and crop water use and experience savings of **0.94** inches/acre totaling **940 AF** of water savings. The cumulative water savings in the Upland Decline Area is projected to be **5,170 AF/yr** on all **119,996 acres**.

(107,996 ac) x (0.47 in) = 50,758.6 ac-in = **4,230 AF** (Real-Time ET and Water Applied)

(12,000 ac) x (0.94 in) = 11,280 ac-in = **940 AF** (Real-Time Soil Moisture, ET, and Water Applied)

Total Estimated Water Savings: **5,170 AF/year**

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 Upland Decline Area by metering extractions at all groundwater irrigation wells. Average groundwater pumping has been determined based on the previous four year's pumping:

Year	Annual Irrigation Extraction (AF)
2019	63,749.74
2018	75,170.69
2017	109,333.40
2016	108,157.20
Average (AF/yr)	**89,102.76**

This volume represents total irrigation water application on all groundwater 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 **13,365.4 AF.** Operational losses would be due to deep percolation, runoff, evaporation, and off-site transpiration due to current inefficiencies. If estimated water conservation of **5,170 AF** due to Improved Application Efficiency were achieved, this would represent a **38.7%** reduction in operational losses in the Upland Decline Area.

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 MRNRD 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. Approximately 70% 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 which occurred after flow meters were installed. This 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 of data, reported to the MRNRD and state agencies for 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. However, meters currently not installed to manufacturer's specifications will be corrected 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 with FlowConnect™ 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** or up to **0.94 inches/ac** where remote soil moisture monitoring is used in addition to 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—Water Supply Reliability

*Up to **18 points** may be awarded under this criterion. This criterion prioritizes projects that address water reliability concerns, including making water available for multiple beneficial uses and resolving water related conflicts in the region.*

Please address how the project will increase water supply reliability. Proposals that will address more significant water supply shortfalls benefitting multiple sectors and multiple water users, will be prioritized. General water supply reliability benefits (e.g., proposals that will increase resiliency to drought) will also be considered. Please provide sufficient explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

1. ***Will the project address a specific water reliability concern? Please address the following:***

- ***Explain and provide detail of the specific issue(s) in the area that is impacting water reliability, such as shortages due to drought, increased demand, or reduced deliveries. Will***

the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?

Yes, The Republican River Basin has been designated as over-appropriated for water resources by the Nebraska Department of Natural Resources (NDNR). Irrigated Agriculture is the major water user in the basin. Water savings demonstrated by improved irrigation efficiency will improve water availability for all users including surface water districts, municipalities, and industries.

Water saved from reduced irrigation water application will remain in the local aquifer and slow declining groundwater levels and reduce interference between water wells. This will improve drought resiliency and water reliability for groundwater users in the Republican River Basin Since groundwater is conserved in aquifers that discharge into the Republican River, this project will improve baseflow in the Republican River to the benefit of water users as well as wildlife.

- ***Describe how the project will address the water reliability concern? In your response, please address where the conserved water 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.***

Real-time data for irrigation water use, crop water use, and in some cases, soil moisture monitoring, will improve the irrigation water management on nearly **120,000 acres** and have a drastic impact on groundwater conservation. Improved timing of irrigation water applications will reduce interference between large capacity wells. Conserved groundwater will remain in the aquifer for other users and will improve baseflow to the Republican River. Groundwater levels will be maintained for domestic, municipal, and industrial users.

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

Telemetry on irrigation flow meters will provide real-time water use data for scheduling decisions on these irrigation systems. Local weather stations with telemetry will provide local regional crop water use data to aid irrigation scheduling decisions. Remote data on irrigation flow meters will enable irrigators to fine-tune applications to meet crop water use needs. Soil moisture probes equipped with telemetry will further be used on select fields to monitor soil moisture in the active root zone for irrigation scheduling. This remote metering project will further the adoption of soil moisture monitoring for and other water management sensors for improved water conservation.

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

The estimated quantity of water savings related to this project is expected to be **5,170 AF/year**. The conserved water will remain in the local aquifer system for irrigation, municipal, and industrial uses. In addition, baseflow will be improved to the Republican River for surface water appropriators because of improved storage in aquifers that discharge in the Republican River.

2. ***Will the project make water available to achieve multiple benefits or to benefit multiple water users? Consider the following:***

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

Yes: Water savings conserved by improved irrigation efficiency will improve water availability for all users including surface water districts, municipalities, and industries as well as recreational uses. Groundwater that is conserved will slow the decline or maintain water levels for all groundwater users. Surface water resources will benefit from improved baseflow due to groundwater discharge from upland geologic formations to the Republican River Valley. Several surface water impoundments that are used for irrigation including Harry Strunk Lake, Swanson Reservoir, and Hugh Butler Lake will have improved surface water flows to maintain water levels for recreational uses including fishing, swimming, and boating.

- ***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.***

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 the project benefit a larger initiative to address water reliability?***

Yes, this project will improve the availability of water for the Interstate Compact with Kansas by improving groundwater discharge from the uplands into the Republican River Valley. Such benefits and efforts to produce them are expected to ease friction between the water management and water supply entities within Nebraska's portion of the Republican Basin and will aid in the compliance with the Republican River Compact.

- ***Will the project benefit Indian tribes?***

No Indian tribes reside in the project area.

- ***Will the project benefit rural or economically disadvantaged communities?***

Yes, many of the communities located in the project area of the MRNRD have been negatively affected by the agricultural economy. This project will support agricultural production as well as the businesses supported by irrigated agriculture.

- ***Describe how the project will help to achieve these multiple benefits. In your response, please address where the conserved will go and where 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.

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.

3. ***Does the project promote and encourage collaboration among parties in a way that helps increase the reliability of the water supply?***

- ***Is there widespread support for the project?***

Yes, remote telemetry to improve irrigation water management has become very popular in the MRNRD over the past two years with the first fifty operators joining the High-Tech Irrigation Project and the deployment of Flow Connect in the Quick Response Area. The MRNRD thirteen-member Board also approved the resolution attached at their regular board meeting on **August 11, 2020.**

- ***What is the significance of the collaboration/support?***

This project represents a cooperative effort between the MRNRD, the Nebraska Department of Natural Resources (NDNR), Seim Ag Technology, McCrometer Corporation, and OTT/Hydromet Corporation with assistance from the Bureau of Reclamation. The irrigation management of several dozen farmers will be positively affected by this partnership. This collaboration will result in one of the first regional data networks for water management in the country.

- ***Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?***

Yes, this project represents Phase II of MRNRD's initiative to upgrade all irrigation wells in the district with remote meter telemetry for water use following the upgrade of meters in the Quick Response Area aided by the FY'19 Water Smart grant. Phase III will complete the remaining portions of the district following the project in the Upland Decline Area. These activities have the potential to be replicated in other water management districts in the Republican River Basin, other portions of Nebraska, other states, and other watershed basins.

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

Water consumption reduced under the project within will help ensure 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 upland areas. The project will help prevent and/or reduce statewide liability for noncompliance that include significant penalties. 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.

Information on depletions to stream flow caused by groundwater use for 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.

- ***Describe the roles of any partners in the process. Please attach any relevant supporting documents.***

MRNRD will administer the Remote Meter Monitoring Program by contacting landowners for access, directing contractors to irrigation well sites for telemetry installation, and all grant administration for the project.

Seim Ag Technology will serve as the contractor to install meter telemetry systems, soil moisture systems, and provide field service on all telemetry products.

McCrometer Corporation will manufacture and supply meter telemetry equipment for all McCrometer Propeller meters.

OTT/Hydromet will supply remote telemetry units and sensors for weather stations and soil probes and technical support on software applications for data collection and distribution

NDNR will be contributing $900,000 for the Remote Metering Program and support of planning efforts for basin-wide water management activities.

4. ***Will the project address water supply reliability in other ways not described above?***

This project will improve the balance between surface water uses and groundwater uses. Groundwater use will be more easily mitigated so as not to interfere with surface water appropriators.

Evaluation Criterion C—Implementing Hydropower

This project will not have a hydropower component.

Evaluation Criterion D—Complementing On-Farm Irrigation Improvements

*Up to **10 points** may be awarded for projects that describe in detail how they will complement on-farm irrigation improvements eligible for NRCS financial or technical assistance.* 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.***

The High-Tech Irrigation Management Program has been a successful program and has been in effect for four years and has funded the installation of 49 meters with telemetry and the same number of soil moisture probes with telemetry on irrigated farms in the MRNRD. This program has recently received funding for 100 total sites and will complement the water conservation activities of this program.

As water savings are realized through the High-Tech program, additional farmers will seek out soil moisture monitoring practices on additional fields and farmers will seek assistance through programs such as EQIP. The MRNRD is currently in the process of pursuing funding through the USDA NRCS to complement water savings through this remote meter monitoring program.

- ***Provide a detailed description of the on-farm efficiency improvements.***

Real-time water irrigation use from meters will be delivered via telemetry to the farmers of the district for irrigation management. MRNRD has deployed 8 weather stations (as a result of the FY'19 Water Smart project) with sensors capable of generating local crop water use data in real-time. This network of weather stations will supply evapotranspiration data to farmers in this project area as well. ET data and irrigation water use data will be delivered on the same software platform to the irrigators. Farmers that have participated in the High-Tech Irrigation Program will also have access, through the same software, to their soil moisture data. All of these data will factor into improved irrigation scheduling to limit excess water applications on groundwater irrigated land supplied by aquifers that discharge into and thereby contribute to baseflow in the Republican River Valley of the MRNRD.

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

The MRNRD is in the process of applying for USDA NRCS funding funds to complement this project and further water conservation in the Republican River Basin of the MRNRD once all phases of this initiative are complete.

- ***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.***

Due to the popularity of the High-Tech Irrigation Project, interest will be high for remote soil moisture monitoring incentivized through NRCS programs currently being pursued. The bulk of this remote metering project will be to upgrade irrigation flow meters in the MRNRD with

remote telemetry. Currently, the policy of the Nebraska NRCS is that they will fund a new irrigation flow meter with telemetry, but not to upgrade an existing meter with telemetry. This is significant since all wells in the MRNRD are already metered. Automated meter reading is a technology that has evolved becoming more efficient and economical since meter installation was required in MRNRD in the early 2000s. This project will remove a financial obstacle to irrigators to implement the use of real-time data for irrigation water management as well as facilitating the adoption of irrigation scheduling through remote soil moisture monitoring in the future with NRCS assistance.

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

See attached letters of support and participation.

- ***Describe how the proposed WaterSMART project would complement any on-going or planned on-farm improvement.***

This project will support the adoption of the existing High-Tech Irrigation Management program which encourages and implements soil moisture monitoring and the use of real-time crop-water use data for irrigation scheduling.

- ***Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how?***

Yes, this project will provide real-time irrigation water use and ET_o data to all groundwater irrigators in the upland areas of the Republican River Basin in the MRNRD via remote telemetry for improved irrigation management.

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

Yes, when real-time irrigation water application, crop water use, and additional soil moisture monitoring (through the NRCS RCPP) are coupled together for irrigation water management, irrigation water savings can be maximized and compounded beyond any one practice used.

This project is also significant since NRCS policy in Nebraska will not provide cost-share or incentive payments for telemetry on existing irrigation flowmeters. This project will remove a financial barrier to the implementation of the practice of irrigation management with real-time water use and facilitate the adoption of telemetry for other practices such as soil moisture monitoring.

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

Retrieving irrigation water application data and crop water use in real-time will aid farmers in making irrigation scheduling decisions improving seasonal and application irrigation efficiency. This information will alert the irrigators to current environmental factors that may make an irrigation event unnecessary, thus conserving groundwater for future use or that will support baseflow in the Republican River.

- **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.**

Conservative estimates of **0.47** inches/acre are projected on **107,996** irrigated acres in the project area utilizing real-time water application and crop water use for irrigation scheduling. An additional **0.47** (**0.94** total) inches/acre is projected to be conserved on **12,000** acres that utilize soil moisture monitoring coupled with real-time water application and crop water use data.

(107,996 ac) x (0.47 in) = 50,758 ac-in = **4,230 AF** (Real-Time ET and Water Applied)

(12,000 ac) x (0.94 in) = 11,280 ac-in = **940 AF** (Real-Time Soil Moisture, ET, and Water Applied)

Total Estimated Water Savings: **5,170 AF/year**

Evaluation Criterion E—Department of the Interior and Bureau of Reclamation Priorities

*Up to **10 points** may be awarded based on the extent that the proposal demonstrates that the project supports the Department of the Interior priorities. Please address 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 proposal.*

1. ***Creating a conservation stewardship legacy second only to Teddy Roosevelt***
a. Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment;

As a leader and partner with state and federal stakeholders in local water planning and outreach efforts, the District will utilize remote data acquisition from water management sensors to conserve water on irrigated lands. The real-time data includes water application from irrigation flow meters, local weather observations for crop water use that will be broadcast to water users for improved irrigation scheduling, and soil moisture data from soil probes on select fields. Data will be available via personal computer or smart phone. This project represents a science-based approach to irrigation best management practices (BMPs) by providing real-time water management data to water users in the MRNRD.

2. ***Utilizing our natural resources***
a. *Ensure American Energy is available to meet our security and economic needs;*

The predominant use of electricity during the summer in Nebraska is for irrigation. This project has the capability to curtail water use and therefore electricity demand on **119,996 acres** in the MRNRD. The energy saved could be used in homes, local industries, or other irrigated lands within or outside the MRNRD. This project will aid in the conservation of electricity during the peak demand times in the State of Nebraska.

3. Restoring trust with local communities

a. Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;

In the MRNRD, those closest to managing groundwater resources are the farmers of irrigated land and the staff and board members of the MRNRD. This project will give them the tools to not only better manage groundwater resources, but also improve the relationships with the bordering Natural Resource Districts that have the same responsibilities as well as the State of Kansas with which the State of Nebraska has an Interstate Compact on the Republican River.

b. Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.

Pursuant to the Interstate Compact on the Republican River, the MRNRD is required to report water use with the Nebraska Department of Natural Resources. This project will improve Compact Compliance based on actual pumping rather than estimated. Pumping data will be available instantaneously for reporting to state agencies for Compact purposes.

4.Striking a regulatory balance

a. Reduce the administrative and regulatory burden imposed on U.S. industry and the public;

Farmers in the MRNRD have been subject to groundwater pumping restrictions or allocations since 2005. The technology implemented under this project will better enable these farmers to remain within their pumping allocations or possibly allow further reductions in pumping. In the future, this may facilitate the marketing of water allocation credits among water users creating further efficiencies.

5. Modernizing our infrastructure

a. Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;

This project represents a Public/Private partnership between the Bureau, MRNRD, NDNR, McCrometer, OTT/Hydromet, and the installation contractor, Seim Ag Technology to establish a virtual data network for water management. McCrometer, OTT/Hydromet, and Seim Ag Technology will be instrumental in not only the production and installation of meters and telemetry equipment, but also the distribution of data to water users.

b. Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs;

This proposal will remove a financial impediment in Phase II of the development of a virtual data network for irrigation water management for groundwater irrigators in the MRNRD. This network will not require the capital outlay for traditional infrastructure of radio towers or other physical structures. This will create a stand-alone network independent of other entities that may increase transmission costs. Utilizing remote telemetry to acquire data from irrigation flow meters and other irrigation water management sensors will modernize data management for

groundwater management in the MRNRD. The MRNRD will coordinate project activities with McCrometer, OTT/Hydromet, and Seim Ag Technology to upgrade existing water meters with remote data acquisition technology by providing technical support for the installation, troubleshooting field communications, and instructions with software and data management. The agency will no longer need to drive to irrigation wells to manually read water meters and then manually input data for management and allocation purposes. The telemetry system will also alert MRNRD staff of meter failures and enable them to address repairs immediately. Water users will have real-time access to water being applied to their fields. This will enable them to apply water as close as possible to the rate at which the crop uses it.

Reclamation Priorities

2. Streamline Regulatory Processes and Remove Unnecessary Burdens to Provide More Water and Power Supply Reliability

Farmers in the MRNRD have been subject to groundwater pumping restrictions or allocations since 2005. The technology implemented under this project will better enable these farmers to remain within their pumping allocations or enable further reductions in pumping. Remote access to pumping data will enable irrigators to independently determine the status of their pumping allocation rather than contacting MRNRD office staff creating other efficiencies.

3. Leverage Science and Technology to Improve Water Supply Reliability to Communities

Totalizing flow meters are necessary for the sound and scientific management of groundwater. This project will deploy meters with real-time telemetry to accurately measure water extracted combined with real-time data acquisition for crop water use data and, in some cases, soil moisture for significantly improved irrigation water management in the district. This will improve water supply reliability to all water users in MRNRD by maintaining groundwater extraction at or below established allocation limits.

4. Address Ongoing Drought

MRNRD Rules and Regulations establish quantities of sustainable groundwater pumping. This project facilitates improved management of the groundwater used for irrigation in the Upland Decline Area of the MRNRD. Accurate measurement and availability of real-time water management data will improve on-farm groundwater management, which is important not only in drought years, but in wet years as well, since groundwater conserved in wet years will improve availability in drought years.

Evaluation Criterion F—Implementation and Results ***Up to 6 points may be awarded for these subcriteria.***

Subcriterion F. 1 - Project Planning: *Points may be awarded for proposals with planning efforts that provide support for the proposed project.*

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

The MRNRD recently adopted their third generation Integrated Management Plan (IMP) and has had a Groundwater Management Plan since 1986. The IMP addresses a specific pumping standard to meet the recent Supreme Court Decisions in managing the Republican River Compact and consumptive use. Past controls have been irrigation acre reductions, moratorium on new irrigation wells, certified irrigated acres with no new acres being added and installation of irrigation meters on all of irrigation wells. One of the objectives set forth in the newly adopted IMP in January of 2016 was the prevention of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the District. Our objective for this project is to reduce the total withdrawal of groundwater with the use of real-time telemetry.

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

One objective of the 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, MRNRD'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.**

Subcriterion F.2— Performance Measures: ***Points may be awarded based on the description and development of performance measures to quantify actual project benefits upon completion of the project.***

The performance measure for this project will be the water volume conserved as a result of the practices implemented. Fortunately, the MRNRD has required the metering of irrigation wells in the district for 15-20 years. As a result, the district has a history of groundwater extraction data to evaluate the effectiveness of the practices implemented and the progress toward the projection of conserving **5,170 AF** of water on **966** wells in the Upland Decline Area of the Republican River Basin.

The addition of remote telemetry will also aid the district in reporting of water use within the upland areas. The district will now have the capability of querying real-time data for a priority area such as the Upland Groundwater Decline Area for compliance with district pumping allocations as well as improving water management on the farm level.

Subcriterion F.3— Readiness to Proceed: *Points may be awarded based upon the extent to which the proposed project is capable of proceeding upon entering into a financial assistance agreement.*

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

The MRNRD has already begun with the implementation of remote telemetry for irrigation management over two years ago with wide acceptance and success. The district has begun working with a trusted local contractor and is coordinating with the manufacturers of the telemetry equipment and software. Upon the successful award of this proposal, MRNRD will begin in the Fall of 2021 to install approximately 322 meters upgraded with telemetry per year outside of irrigation season. Over the next three years, MRNRD contract with Seim Ag Technology for site assessment and installation of telemetry technology for irrigation flow meters and other water management sensors. Seim Ag Technology is a family run company with four full-time employees and will add additional staff as necessary to perform required duties.

Sept 17, 2020: Application submitted to Bureau

Dec, 2020: Successful notification of award from the Bureau

April, 2021: Sign contract with the Bureau

July, 2021: Deploy soil moisture probes in Phase 2 of High Tech Irrigation Program

November, 2021 - March, 2022: Install ~**322** telemetry equipped flowmeters

July, 2022: Deploy soil moisture probes in Phase 2 of High Tech Irrigation Program

November, 2022 - March, 2023: Install ~**322** telemetry equipped flowmeters

November, 2023 - March, 2024: Install ~**322** telemetry equipped flowmeters

November, 2024 – Feb, 2025: Install any remaining telemetry units due to weather conditions, etc.

March, 2025: Prepare Final Project Report for Bureau

- ***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 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.

- ***Describe how the environmental compliance estimate was developed. Has the compliance cost been discussed with the local Reclamation office?***

Since no construction or excavation is required for this project, environmental compliance costs will be minimal. Telemetry equipment will be installed to irrigation systems that already exist. Soil moisture monitoring stations will be installed and removed in portions of fields already cultivated. Environmental compliance has been discussed with Aung K. Hla in the local McCook, NE Bureau of Reclamation office prior to the submittal of this proposal.

Evaluation Criterion G— Nexus to Reclamation Project Activities (4 Points)

Up to 4 points may be awarded if the proposed project is in a basin with connections to Reclamation project activities. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

Is the proposed project connected to Reclamation project activities?

- ***Is the project in the same basin as a Reclamation project or activity?***

The Proposed project is in the Republican River Valley 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

- ***Does the applicant receive Reclamation project water?***
- ***Is the project on Reclamation project lands or involving Reclamation facilities?***

The MRNRD 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 contribute water to a basin where a Reclamation project is located?***

Although Enders Reservoir and Harlan County Lake are outside of this project area, benefits will be derived from this project for the water users that these Reclamation projects serve through improved baseflow due to reduced groundwater pumping. The Frenchman River 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 upland aquifers provide discharge to the Republican River Valley for baseflow in the Republican River.

- *Will the project benefit any tribe(s)?*

No tribes are located within the project area.

Evaluation Criterion H— Additional Non-Federal Funding (4 points)

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided using the following calculation:

Non-Federal Funding	$1,988,957	60.5%
Total Project Cost	$3,288,957	

Project Budget

Funding Plan and Letters of Commitment

The non-federal cost share required for the project has been appropriated in expectation of pursuing this project and thus is already available to the MRNRD. Third-party funding in the amount of **$900,000** will be contributed by the NDNR to conduct Phase 2 of the Remote Metering Program (see attached letter of participation). Other non-federal funding will be provided solely by the MRNRD. The MRNRD 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 MRNRD 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 MRNRD is **$1,088,957.** The MRNRD board has resolved to budget these funds over the three-year span of this grant proposal. No contingencies are associated with the funding commitment.

The MRNRD 's contribution to the cost-share requirement will be monetary. Funds expended by MRNRD will be used to purchase remote meter telemetry equipment, miscellaneous equipment for installation, and contractor services for installation. Grant funds from the Bureau would be used for the same expenses. The remaining balance of **$1,300,000** is requested of the Bureau of Reclamation in this $3,288,957 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 from project partners are attached beginning on page 30.

Budget Proposal

Table 1.— Total Project Cost Table

Funding Sources	% of Total Cost	Total Cost by Source
BOR Water & Energy Efficiency Grant	39.5%	$1,300,000
Middle Republican NRD (MRNRD)	33.1%	$1,088,957
Nebraska Dept of Natural Resources (NDNR)	27.4%	$900,000
Totals	100.00%	$3,288,957

Table 2 - Budget Proposal

Budget Item Description	Computation $/unit	Computation 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	$3,011.00	966	ea	$2,908,626
Subtotal				**$2,908,626**
Supplies and Materials				
Subtotal				**$0**
Contractual/Construction				
Flow Meter Telemetry Site Assessment/Installation	$350.00	966		$338,100
Data Acquisition/Processing	$21.60	1932	2 yrs	$41,731
Subtotal				**$379,831**
Total Project Costs				**$3,288,957**

Budget Narrative

As indicated in Table 2, the only costs for which the MRNRD is seeking reimbursement are the costs of the equipment and supplies associated with the project and contract services to install the telemetry equipment. No salaries, wages, or travel costs are included. MRNRD 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 quotes the MRNRD has received for telemetry equipment required for accessing meters. All equipment will be installed under a contract as quoted by an installer experienced in this work. The $350/site installation and site assessment charge includes 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 any flow conditioning devices. This cost has been compared with other similar service providers and was determined to be reasonable. The line item for data acquisition and processing is the data acquisition costs incurred during the duration of the project to install 966 meter telemetry units (322 in the first year, an additional 644 in the second year, and 966 in the third year for a total 1932 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 MRNRD, as may already be required, will pay additional and necessary amounts.

Total project costs are **$3,288,957**. The MRNRD will be responsible for **33.1%**, the NDNR will contribute **27.4%** and the Bureau is requested to contribute **39.5%.**

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 or 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. To the contrary, 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 MRNRD for this project.

Official Resolution

RESOLUTION OF THE MIDDLE REPUBLICAN NATURAL RESOURCES DISTRICT

Resolution No. MR2-2020

WHEREAS, the Board of Directors agrees that Jack Russell, General Manager of the Middle Republican Natural Resources District, 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 program; and

WHEREAS, Management of the Middle Republican Natural Resources District has reviewed and supports the application for WaterSMART Grant funds; and

WHEREAS, the Middle Republican Natural Resources District 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 Middle Republican Natural Resources District 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 Middle 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.

Board Chairman

8/11/20
Date Approved

Letters of Commitment/Participation

NEBRASKA

Good Life. Great Water.

DEPT. OF NATURAL RESOURCES

April 7, 2020

Jack Russell, Manager
Middle Republican Natural Resources District
jrussell@mrnrd.org

sent via electronic mail only

Dear Jack:

The Nebraska Department of Natural Resources (NeDNR) received your March 11, 2020, request to amend MRNRD's July 15, 2019, proposal for funding under NeDNR Contract #1055. We understand the requested changes to MRNRD's proposal to be as follows:

- To remove the request for $1,800,000 for the FVID Long Term Lease project;
- To use $900,000 of the money that had previously been allotted for the FVID Long Term Lease project for additional permanent irrigation retirements, bringing the State's total potential contribution for permanent irrigation retirements under Contract #1055 to $1,500,000;
- To use $900,000 of the money that had previously been allotted for the FVID Long Term Lease project to expand MRNRD's Remote Meter Monitoring project into the Western Area of the MRNRD where there are declines outside the Quick Response Area, adding 500 remote meters to the project.

In addition, we understand that the $900,000 for 500 additional remote meters is to be included in a separate sub-contract from the $900,000 already allotted for the Remote Meter Monitoring in the Quick Response Area project described in the original proposal.

NeDNR is in agreement with these changes. Carol Flaute will continue to work with you to complete the sub-contract for the ongoing Remote Meter Monitoring in the Quick Response Area project, and then she will work with you to develop a sub-contract for the new Remote Meter Monitoring project for the Western Area of the MRNRD.

We appreciate the MRNRD's efforts to work toward reducing long-term groundwater depletions and look forward to continuing to implement our joint integrated management plan.

Sincerely,

Jesse Bradley
Interim Director

Jesse Bradley, Interim Director
Department of Natural Resources
301 Centennial Mall South
P O Box 94676
Lincoln, Nebraska 68509
OFFICE 402-471-2363
FAX 402-471-2900
dnr.nebraska.gov

McCROMETER

3255 West Stetson Avenue
Hemet, CA 92545 USA
Tel (951) 652-6811
Fax (951) 652-3078
www.mccrometer.com

August 2, 2020

Middle Republican NRD
Attn: Jack Russell, General Manager
220 Center Ave
P.O. Box 81
Curtis, NE 69025

Re: Bureau of Reclamation Water Smart Application; **"Phase II of the Remote Irrigation Meter and Irrigation Conservation Project for the Upland Decline Area of the Middle Republican Natural Resources District"**

Dear Mr. Russell:

McCrometer is glad to be a partner in the project titled **"Phase II of the Remote Irrigation Meter and Irrigation Conservation Project for the Upland Decline Area of the Middle Republican Natural Resources District"**. McCrometer will commit to supplying meters and telemetry equipment as well as technical support upon the successful award of this grant proposal.

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

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,

Kenneth A Quandt
Market Development Manager
McCrometer, Inc

OTT Hydromet Corp. | 22400 Davis Drive, Suite #100 | Sterling, VA 20164 | USA | +1 (703) 406-2800 | sales@ottHydromet.com | www.ottHydromet.com

August 11, 2020

Middle Republican NRD
Attn: Jack Russell, General Manager
220 Center Ave.
Curtis, NE 69025

Re: Bureau of Reclamation WaterSMART Application, **"Phase II of the Remote Irrigation Meter and Irrigation Water Conservation Project for the Upland Decline Area in the Middle Republican Natural Resources District"**

Dear Mr. Russell:

OTT HydroMet Corporation is glad to be a partner in the project titled **"Phase II of the Remote Irrigation Meter and Irrigation Water Conservation Project for the Upland Decline Area in the Middle Republican Natural Resources District."** Through our OTT and ADCON product offerings, OTT HydroMet will continue to provide equipment for ETo weather stations, soil moisture monitoring, and groundwater level monitoring; server software and data access for growers and district staff; and support resources for network operation and data interpretation.

Our experience interacting with growers in the Middle Republican NRD has shown that the interest for this project is high and irrigation water management practices implemented to date are already showing evidence of water savings. We hope to continue building on the progress made so far and we look forward to partnering with District staff, McCrometer, and other program partners to conserve and protect water resources in the region.

Thank you for the opportunity to serve and support the patrons and stakeholders of the Middle Republican NRD.

Respectfully,

Adam Setzler

Business Development Manager
OTT HydroMet Corporation

Frontier Farms
Daniel Nelsen
39920 Road 745
Moorefield, NE 69039

August 18, 2020

Jack Russell, Manager
MRNRD
208 Center Ave
Curtis, NE 69025

Re: WaterSmart Water & Energy Efficiency Grant Phase 2 for MRNRD Remote Meters

I am writing in support of the Middle Republican NRD's project to expand more remote meter-reading technology into upland areas of the MRNRD. I among other irrigators in the district have worked diligently to make my operation as efficient as possible. By having these technologies at our fingertips helps make my daily activities on the farm easier. I currently have a couple of these meters on my farm and by having these its easier for me to have a better handle on my water usage with real time data. When I talk about water use management, it means I can log in anywhere on my devices and have access to my system and be able to know if everything is running efficiently and accurate. I really enjoy having the real time data of how much water I have pumped at any given time. As we are an allocated District, us farmers need to know these things so that we can avoid over watering when it is not needed.

I believe that if the MRNRD had the assistance of this Grant that the area farmers would have another tool to be able to utilize on their farms and be able to make more timely effective decisions. I also want to preserve this precious resource we call the Ogallala Aquifer. So, for me and my farm this is just another tool to help me in doing just that.

Without the efforts of the MRNRD applying for this grant and helping the farmers to gain access and educate along the way some of us may not be able to get or understand this technology. I strongly support the District and all the efforts to help us all be more sustainable at the end of the day. Thanks for the project and the advantages that comes with it.

Sincerely,

Daniel Nelsen, Frontier Farms

Frenchman Cambridge Irrigation District

"Water is Life"

www.fcidwater.com

August 13, 2020

Middle Republican Natural Resource District
Jack Russell, Manager
P.O. Box 81
Curtis, NE 69025

Reference: Support for WaterSMART Grant Application

Jack:

This is a letter of support for the Middle Republican Natural Resources District (MRNRD) Grant application for precise real time telemetry and water reporting. Frenchman Cambridge Irrigation District, as a basin stakeholder, is interested in sustaining the water supplies of the Republican River Basin for all water users. This project helps with several of the Republican River Basin-Wide Plan goals and objectives and helps insure a long-term water supply.

Projects like this increase certainty for long-term water supplies and reduce the need for heavy handed regulatory actions; increase collaborative efforts among water management entries and stakeholders within the Basin.

Long term viability of irrigated agriculture in the Republican River Basin is paramount to all residents of the Basin and the State. FCID encourages and supports the MRNRD's efforts to increase efficiency in water management efforts.

Sincerely,

Brad Edgerton, Manager
Frenchman Cambridge Irrigation District

Frenchman Cambridge Irrigation District, 1310 West Highway 6 & 34, P.O. Box 116, Cambridge NE 69022
Phone (308)697-4535, Fax (308) 697-3218, Toll Free (800) 841-0419, Email: FCID@fcidwater.com

OWEN WILSON
74466 Road 400 Moorefield, NE 69039

August 10, 2020

Jack Russell, Manager
MRNRD
220 Center Ave
Curtis, NE 69025

Re: WaterSmart Water & Energy Efficiency Grant Phase 2

Dear Mr. Russell:

I would like to indicate my support for the Middle Republican Natural Resources District's remote meters. By having these meters available for me and other irrigators within the district we can have a tool to help us better manage our water as we have been given an allocation. I feel this tool is of value in helping me determine whether I'm over or under watering. I also like these meters due to the fact I can make a time efficient decision if I need to for my operation.

It is nice to have the assistance from the NRD for the education side of these systems as well. We need this type of assistance if we are all going to succeed in the goal of a sustainable natural resource for generations to come.

Efforts from the MRNRD in aiding and providing help for these meters is very helpful. Thank you for pursuing and continuing your project.

Sincerely,

Owen Wilson
Frontier County Farmer