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## **Executive Summary:**

Date: March 14, 2019

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

### **Project Summary:**

The MRNRD is proposing an innovative irrigation water management system for groundwater irrigated acres within the Quick Response area of the Republican River basin of this Southwest Nebraska NRD. 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 1,000 irrigation flow meters within quick response area of the district for improved on-farm water management and reporting of water use to the district. Weather stations with telemetry will also be deployed across the district to collect data necessary for evapotranspiration (ET<sub>o</sub>) 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. In addition, select farms in the project area will utilize soil moisture probes with telemetry to better manage irrigation applications in conjunction with water use data supplied by the meter as well as local ET<sub>o</sub> data from the weather stations. This project will greatly improve the on-farm water conservation in the district and preserve and enhance groundwater for baseflow in the Republican River Valley in Nebraska. The availability of real-time water use data to the MRNRD will also improve management of water on a basin-wide scale including reporting water use to the State of Nebraska and the execution of Compact Compliance with the State of Kansas on the Republican River.

This project is expected to last three years, beginning in the winter of 2019-2020 and ending in the winter of 2022-2023. 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 to 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 completed 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 on all of these acres of 12 inches per acre per year over a five-year period. Consequently, the allocation for MRNRD groundwater irrigators is 60 inches per acre per over a five-year period. This allocation began in 2005.

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. The MRNRD estimates that 0.74 inches of water were saved per acre per year on these fields over the past two years. In December of 2018, the MRNRD was awarded \$250,000 from the NDNR to implement Phase 2 of this program.

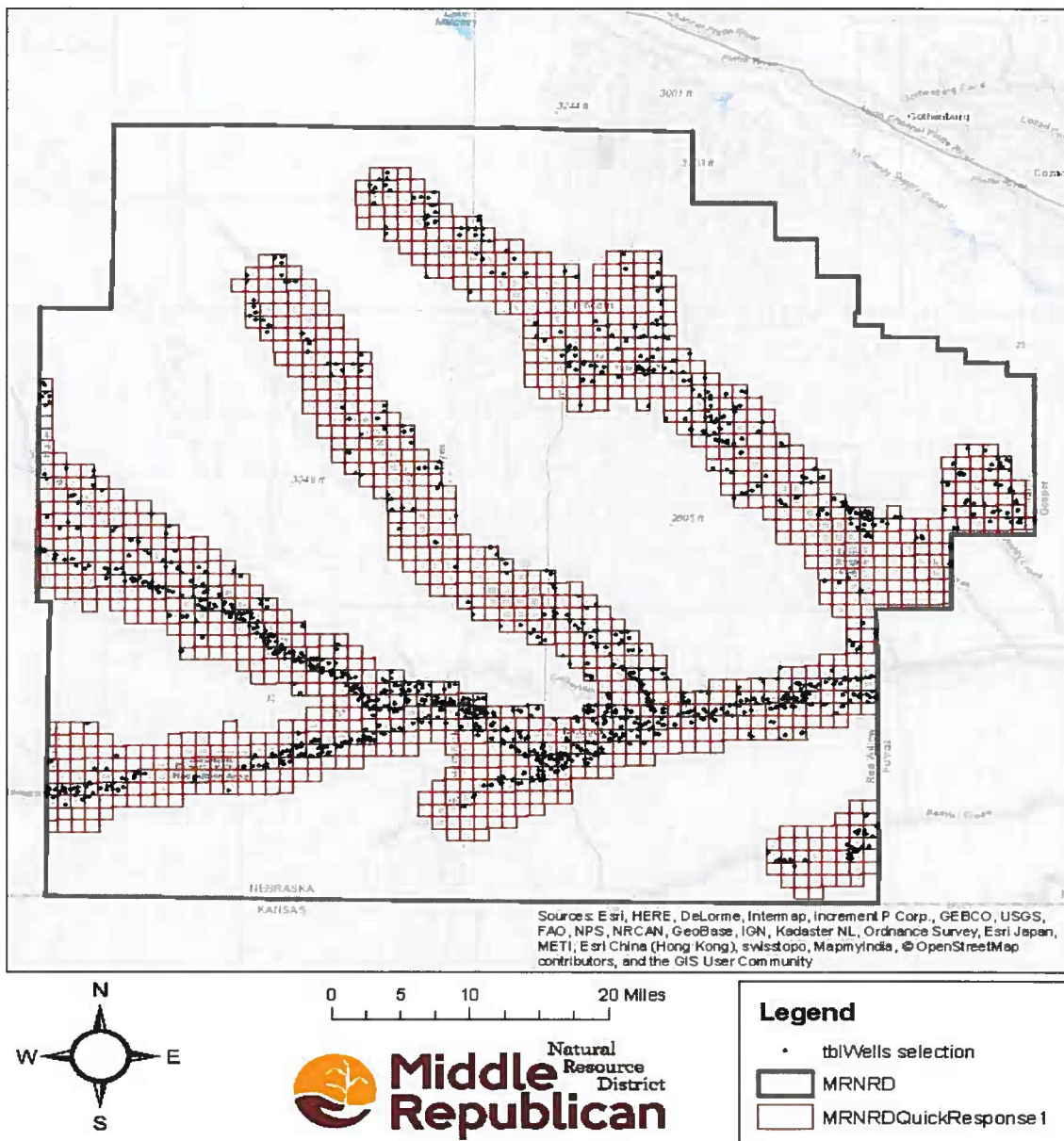
Because of the water savings and wide-spread acceptance of remote technology aiding irrigation management, the MRNRD proposes with this application to expand remote meter-reading technology into the Republican River Valley of the MRNRD by upgrading 1,000 meters within the “quick response” area of the valley with FlowConnect™ technology from McCrometer. MRNRD will also deploy during this project eight weather stations equipped with sensors necessary for monitoring crop water use or evapotranspiration (ET<sub>o</sub>) 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.

### **Project Location**

The MRNRD is located in southwest Nebraska and is headquartered in Curtis, NE. The district includes all or parts of Red Willow, Hitchcock, Hayes, Frontier, and Lincoln Counties. The project area as shown on the following map is the Quick Response area of the Republican River Valley and its tributaries within the MRNRD.

## Quick Response Area in MRNRD



### Technical Project Description

This project will implement several water management tools with remote monitoring 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 the quick response area of the MRNRD.

MRNRD has required flowmeters on all irrigation wells in the district since 2000. Approximately **2,813** irrigation wells currently exist in the district, **1,379** of which are in the valley floor of the Republican



River irrigating **87,469 acres**. These are the irrigation wells that are referred to as the quick response wells or those that have the most immediate impact to flows in the Republican River. This project will deploy FlowConnect™ telemetry technology on **1,000** irrigation water meters irrigating approximately **63,850 acres** in the quick response area of 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 flow reading on the meter's register in the field and the data 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 flow calculations.



Contractors proficient in meter installation and remote telemetry have been selected from work done a previous irrigation telemetry project within the district. In addition, weather stations for local crop water use will be placed throughout the district. Telemetry-aided soil moisture monitoring funded by a state grant will be deployed on select fields by this contractor as well. All water use data (meter data), crop water use, and soil-moisture, will be served to farmers through a web-based server on a single website accessible via personal computer or smartphone.

### **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 **5,226** acre-feet of water will be conserved per year as a result of the application of telemetry to irrigation flow meters and other water management sensors **and** improving the accuracy of with which water measurements are made in the quick response area of the Republican River in the MRNRD. Real-time telemetry will aid farmers in their on-farm water management decisions, while water measurements for Republican River Compact Compliance will improve as a result of this project as well.

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 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 we propose will be made easier and more effective by 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 timing of irrigation water applications closer to the needs of the crops as well as improving the application efficiency of water applications. 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 **2,084 AF** will be saved through improved irrigation management practices in the project area.

All groundwater pumped in the Republican River basin must be measured for augmentation pursuant to the Compact on the Republican River. MRNRD has been working with a contractor to conduct site surveys of irrigation wells for meter telemetry installation. In the process of doing so, the contractor has realized that approximately 70% of all meter installations are not currently installed to manufacturer's specifications. This creates the likelihood that meters may be reading as much as 10.8% inaccurate based on a study by the University of Nebraska-Lincoln. As a result, the MRNRD is likely augmenting an amount greater than actually pumped. Augmentation is accomplished either through pumping groundwater wells at the N-CORPE site or by purchasing surface water from districts within the MRNRD. The district estimates that

3,142 AF will be saved through reduced augmentation due to improved measurement accuracy. Conserved water will remain in the aquifer or the Republican River for other users including wildlife benefits.

Water conserved through both methods represents an estimated **5,226 AF** of water savings.

**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 2018 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 as well as soil probes for soil moisture monitoring. Five 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. Fifty-six fields were selected from within these five 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 and the same type of irrigation system. Each High-Tech program field was compared to no-less-than nine non-program (control) fields. The differences in water applications are represented in the following table.

<b>Field #</b>	<b>Change in Water Applied (in/ac)</b>
Field 1	-0.1
Field 2	-1.71
Field 3	-3.18
Field 4	0.11
Field 5	0.58
<b>Average Reduction</b>	<b>-0.86</b>

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 **6.238** inches while the average of all control fields was **6.978** inches. Consequently, the MRNRD considers a reasonable and conservative average water savings to be **0.74 inches/ac** for fields utilizing real-time telemetry for irrigation water metering and soil-moisture monitoring.



This proposal will only implement real-time monitoring of irrigation flow meters for water application and of local crop water use for irrigation scheduling on ~70% of the acres in the quick response area. As a result, the district considers a reasonable water savings to be **0.37 inches/ac** in the project area, or half of the water savings experienced in the High-Tech Program where soil moisture monitoring was deployed. This will be implemented on approximately **60,100 acres** of the quick response area. Additionally, fifty of these fields are expected to enroll in Phase 2 of the High-Tech Irrigation Program beginning in 2019. These fifty fields are estimated to be 75 acres each (**3,750 acres** total). The expected water savings would be **0.74 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:

$$(60,100 \text{ ac}) \times (0.37 \text{ in}) = 22,237 \text{ ac-in} = 1,853.1$$

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

$$(3,750 \text{ ac}) \times (0.74 \text{ in}) = 2,775 \text{ ac-in} = 231.25 \text{ AF}$$

Total Estimated Water Savings (Conservation): **2,084.35 AF/year**

### **Improved Measurement Accuracy**

In the process of conducting site surveys of meter installations, the MRNRD has discovered that approximately 70% of all meter installations are not installed to manufacturer's specifications. In many cases this is due to the installation of backflow protection devices on irrigation wells which became a requirement in Nebraska in 2005 after meters were required in MRNRD. Based on University research, the district estimates that 70% of the wells in the project area are on average 6.5% inaccurate. The average annual pumping in the quick response area is **69,053 AF**. Seventy percent of these acres represents a volume of **48,337 AF**. All groundwater pumping in the Republican River Valley is augmented pursuant to the Interstate Compact. Improving the measurement accuracy on these wells by 6.5% will save **3,142 AF** through reduced augmentation.

***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.*

### **Application Efficiency**

Conservative estimates of 0.37 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 0.37 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.

$(60,100 \text{ ac}) \times (0.37 \text{ in}) = 22,237 \text{ ac-in} = 1,853.1 \text{ AF}$  (Real-Time ET and Water Applied)

$(3,750 \text{ ac}) \times (0.74 \text{ in}) = 2,775 \text{ ac-in} = 231.25 \text{ AF}$  (Real-Time Soil Moisture, ET, and Water Applied)

Total Estimated Water Savings: **2,084.35 AF/year**

#### **Improved Measurement Accuracy**

Average Annual Water Volume Pumped in Quick Response Area: **69,053.67 AF**

Volume of 70% of acres (1,000 wells) affected by telemetry: **48,337 AF**

6.5% Volume conserved through improved accuracy: **3,142 AF**

**Total Water saved through both methods: 5,226 AF**

*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 quick response project area by metering extractions at all groundwater irrigation wells. Average groundwater pumping has been determined based on the previous four year's pumping:

2018: 51,419.37 AF

2017: 79,013.66 AF

2016: 74,713.10 AF

2015: 71,068.56 AF

Average: 69,053.67 AF

This volume represents total irrigation water application on all groundwater irrigated acres and average application efficiency of all irrigation types could be considered to be at least 85%. It would be reasonable to estimate current operational losses to be equal to the remaining 15% or 10,358 AF. If estimated water conservation due to Application Efficiency were achieved, this would represent a 20% reduction in operational losses in the Quick Response 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.



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

The McCrometer 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 a flow conditioning device manufactured by McCrometer that corrects disturbances created by backflow protection or chemigation valves, pumps, elbows, or other disturbers. 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. NIST traceability will continue to be the basis for this accuracy.

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

Yes, Seasonal and application efficiency 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 0.37 inches/ac or up to 0.74 inches/ac where remote soil moisture monitoring is used in addition to real-time meter and ET monitoring.

*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)?*

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 aquifer and slow declining groundwater levels and reduce interference between water wells. This will improve drought resiliency for groundwater users in the Republican River Valley, and since groundwater is conserved, 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.*

Conserved groundwater will remain in the aquifer for other users and will improve baseflow in the Republican River. Groundwater levels will be maintained for domestic, municipal, and industrial users. Improved baseflow will be beneficial for SW users and will aid the State of Nebraska in delivery its Compact requirements to the State of Kansas.

- *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. 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 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 **5,226** AF/year. The conserved water will remain in the alluvial aquifer system for irrigation, municipal, and industrial uses. In addition, baseflow will be improved in the Republican River for surface water appropriators.

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)?*

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 maintain or slow decline of water levels for all groundwater users and surface water resources will benefit from improved baseflow due to reduced pumping of quick response wells in the alluvium of 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. 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 quick response 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 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?*

Remote telemetry to improve irrigation management has become very popular in the MRNRD over the past two years with the first fifty operators joining the High-Tech Irrigation Project.

The MRNRD thirteen-member Board also approved the resolution attached at their regular board meeting on March 12, 2019.

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

This project represents a cooperative effort between the MRNRD, the Nebraska Department of Natural Resources, Seim Ag Technology, McCrometer Corporation, and Sutron Corporation with assistance from the Bureau of Reclamation. This collaboration will represent 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, Once this project is complete, it will be repeated in other portions of MRNRD including the remaining wells in the quick response area. These activities also 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. 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. Having near real-time acquisition of water usage 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 Metering Monitoring Program by contacting landowners for access, directing contractors to irrigation well sites for telemetry installation, and handle 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.

**Sutron Corporation** 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 supplying funding through the Water Sustainability Funds for the High-Tech Irrigation Program and support 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 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 two 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 50 additional 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. Upon the completion of this project, the MRNRD intends to pursue funding through RCPP 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 will be delivered through telemetry to the farmers for irrigation management. At the conclusion of this project, MRNRD will have 8 weather stations with sensors capable of generating crop water use in real-time. ET data and irrigation water use data will be delivered on the same software platform as water use 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 irrigation scheduling to limit excess water applications on groundwater irrigated land for the Quick Response wells 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 intends to apply for RCPP funds upon the completion of this project to further water conservation in the Quick-response area of the Republican Valley of the MRNRD.

- *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.*

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. This project will remove a financial obstacle to irrigators to implement this practice 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.

- *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 water use and ET<sub>o</sub> data to all groundwater irrigators in the Quick-Response area of the Republican River Valley through 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 soil moisture monitoring (through the NRCS RCPP) are coupled together for irrigation water management, irrigation water savings can be compounded beyond any one practice being 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 barrier to the implementation of the practice of irrigation management with real-time water use and facilitate the adoption of telemetry of 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.*

Monitoring irrigation water application and crop water use in real-time will aid farmers in making irrigation scheduling decisions. 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 0.37 inches/acre are projected on 60,100 irrigated acres in the project area utilizing real-time water application and crop water use for irrigation scheduling. An additional 0.37 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.

$(60,100 \text{ ac}) \times (0.37 \text{ in}) = 22,237 \text{ ac-in} = 1,853.1 \text{ AF (Real-Time ET and Water Applied)}$

$(3,750 \text{ ac}) \times (0.74 \text{ in}) = 2,775 \text{ ac-in} = 231.25 \text{ AF (Real-Time Soil Moisture, ET, and Water Applied)}$

Total Estimated Water Savings:      **2,084.35 AF/year**

### **Evaluation Criterion E—Department of the Interior 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 in local water planning and outreach efforts, the District will utilize remote monitoring of water management sensors to conserve water on irrigated lands. The real-time data also 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. This 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 **63,850 acres** in the MRNRD. The energy saved could be used in homes, local industries, or other irrigated lands 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 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 has reporting requirements on water use with the Nebraska Department of Natural Resources. This project will improve Compact Compliance based on actual pumping rather than estimated.

*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.

*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, McCrometer, Sutron, and the installation contractor, Seim Ag Technology. McCrometer, Sutron, and Seim Ag

Technology will be instrumental in not only the installation of this 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 to the development of a virtual data network for irrigation water management for groundwater irrigators in the MRNRD. This network will not require 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, Sutron, 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. 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.

**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 just 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 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, the MRNRD's groundwater depletions 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 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 will have a history of groundwater extraction to monitor the effectiveness of the practices implemented and the progress toward the projection of conserving 2,053 AF of water on 1,000 wells in the quick response area of the Republican River Valley.

The addition of remote telemetry will also aid the district in reporting of water use within the quick response area. The district will now have the capability of querying real-time data for a priority area like the quick response area for Compact Compliance reporting 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 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 grant, MRNRD will begin in the Fall of 2019 to install approximately 330 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, weather sensors, and soil moisture probes. Seim Ag Technology is a family run company with four full-time employees and will add additional staff as necessary to perform required duties.

June, 2019:    Installation of weather stations for local crop water use

July, 2019:    Deploy first 25 soil moisture probes of Phase 2 of High Tech Irrigation Program



August, 2019: Successful notification of award from the Bureau

October, 2019: Sign contract with the Bureau

November, 2019 - March, 2020: Install ~330 telemetry equipped flowmeters

July, 2020: Deploy next 25 soil moisture probes of Phase 2 of High Tech Irrigation Program

July, 2019: Install file server for water use data at MRNRD office

November, 2020 - March, 2021: Install ~330 telemetry equipped flowmeters

November, 2021 - March, 2022: Install ~330 telemetry equipped flowmeters

November, 2022 – Feb, 2023: Install any remaining telemetry units due to weather conditions, etc.

March, 2023: 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. Weather stations for crop water use will involve minor installation with a mast and guy wires. Soil moisture monitoring stations will be installed and removed in portions of fields already cultivated. Environmental compliance will be discussed with the local Bureau office upon award.

#### **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?*

- *Does the applicant receive Reclamation project water?*
- *Is the project on Reclamation project lands or involving Reclamation facilities?*
- *Is the project in the same basin as a Reclamation project or activity?*
- *Will the proposed work contribute water to a basin where a Reclamation project is located?*

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

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.

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 the focus is on the wells that have the greatest impact to streamflow.

- *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	\$1,848,092	55.20%
Total Project Cost	\$3,348,092	

## **Project Budget**

### **Funding Plan and Letters of Commitment**

The non-federal cost share required for the project has been obtained in expectation of pursuing this project and thus is already available to the MRNRD. The only third-party funding source will be the grant funds awarded from the NDNR to conduct Phase 2 of the High-Tech Irrigation Program. 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 \$1,598,093. 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 the MRNRD will be used to purchase the telemetry equipment, miscellaneous equipment for installation, contractor services for installation, telemetry software licenses, and computer file server. Grant funds from the Bureau would be used for the same expenses.

No in-kind costs will be incurred before the project start date that MRNRD would seek to include as project costs. No other federal sources of funds have been requested. No pending funding requests would negatively affect the project if not approved.

Letters of participation/commitment from project partners are attached.

Table 1.—Summary of Non-Federal and Federal Funding Sources

Funding Sources		Funding Amount
Non-Federal Entities		
1. Middle Republican Natural Resources District		\$1,598,092
2. NE Water Sustainability Fund (NDNR)		\$250,000
Other Federal Entities		
None		
Other Federal Subtotal		\$0
Requested Reclamation Funding		\$1,500,000
Total Study Funding		\$3,348,092

## Budget Proposal

Table 2

Budget Item Description	Computation		Quantity Type (hours/days)	Total Cost
	\$/unit	Quantity		
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 to install equipment			
Environmental Compliance Costs				
				\$ 500.00
Equipment				
Flow Meter Telemetry Stations	\$2,700.00	1000	ea	\$2,700,000
Soil Moisture Sensor Station	\$3,100.00	50	ea	\$155,000
ET Weather Stations	\$6,500.00	8	ea	\$52,000
Subtotal				\$2,907,000
Supplies and Materials				
Advantage Pro (telemetry) Software	\$ 40,240.00	1	ea	\$40,240
MRNRD File Server	\$ 6,000.00		ea	\$6,000
Subtotal				\$46,240
Contractual/Construction				
Flow Meter Telemetry Site Assessment/Installation	\$350.00	1000		\$350,000
Data Acquisition/Processing	\$134.40	330		\$44,352
Subtotal				\$394,352
Total Project Costs				\$3,348,092

## 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, contractor management, and setting up the data file server. No in-kind services by the district are contributing to federal funds requested. As indicated in the above table, 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 monitoring meters, weather sensors, and soil moisture

probes. Costs for telemetry software and computer file server have been quoted by the telemetry manufacturer. 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 cost for the first year for 330 meter telemetry units until the file server is set up which will reduce data hosting costs.

The environmental and regulatory compliance costs of \$500 listed in the budget table are minimal because the project primarily entails replacing 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.

The total project costs are \$3,348,092. The MRNRD will be responsible for 55% of the costs and the Bureau for 45%.

### **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.

### **Letters of Commitment/Participation**

Please find letters of commitment and participation attached.

# NEBRASKA

Good Life. Great Water.

## DEPT. OF NATURAL RESOURCES

March 14, 2019

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

Dear Jack:

Please consider this letter a formal expression of the Department's support for your Bureau of Reclamation WaterSMART grant application for your NRDs Remote Monitoring and Irrigation Water Conservation Project aimed at improving groundwater and energy efficiency.

The current MRNRD/NeDNR integrated management plan and recently adopted Republican River Basin-Wide Plan recognize the benefits of these types of activities in supporting goals aimed at the long-term sustainability of irrigation uses in the basin within the confines of the State's allocations under the Republican River Compact. Your district's efforts to target management of groundwater pumping in areas of high stream depletion should ensure that the water management benefits of your project are shared between groundwater users and surface water users in your district. Use of these types of technologies coupled with real-time data collection have proven to be valuable tools in supporting irrigators timely on-farm decisions and can lead to reduced groundwater withdrawals. These types of tools can also support more proactive management by the district and improve water supply forecast, which benefit water users throughout the river basin through enhanced certainty of future water supply conditions.

Once again, the Department fully supports your district's efforts to expand the use of these technologies and appreciates your district's efforts in working to achieve the goals of our joint integrated management plan and basin-wide plan.

Sincerely,



Gordon "Jeff" Fassett

Director

Gordon W. "Jeff" Fassett, P.E., 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](http://dnr.nebraska.gov)



## LOWER REPUBLICAN NATURAL RESOURCES DISTRICT

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March 15, 2019

Mr. Jack Russell  
General Manager, MRNRD  
P.O. Box 81  
Curtis, Ne 69025

Dear Jack:

The Lower Republican Natural Resources District fully supports your proposed project to improve water and energy efficiency. This effort demonstrates the Middle Republican NRD's commitment to continually seek water saving projects and targets the Rapid Response Acres in your NRD, helping the state of Nebraska meet Republican River Compact requirements. According to the information you provided, the consumptive use could decrease by over 5,000 acre-feet that is reported to Kansas.

The goal of all the NRDs in the Republican Basin is to manage consumptive use and we support all projects helping us move in that direction. The Republican River Basin Wide Plan, which took effect on March 1, 2019, supports and recognizes efforts that will achieve a long and healthy irrigation presence in Nebraska. This accurate, real-time technology will not only benefit the irrigators in the NRD but will provide a valuable tool to your board of directors in making critical management decisions.

Your project has the potential to help reduce groundwater pumping which may have a positive impact on streamflow.

Sincerely,

Todd R. Siel  
General Manager

"THIS INSTITUTION IS AN EQUAL OPPORTUNITY PROVIDER." 



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

March 15, 2019

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

Re: Bureau of Reclamation Water Smart Application; **"Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District"**

Dear Mr. Russell:

McCrometer is glad to be a partner in the project titled **"Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response 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 over 60 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.





March 15, 2019

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

Re: Bureau of Reclamation Water Smart Application; **"Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District"**

Dear Mr. Russell:

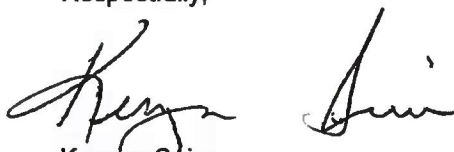
Seim Ag Technology is glad to be a partner in the project titled **" Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District"**. Seim Ag Technology will provide installation services for telemetry equipment, field technical support, and data interpretation for project participants.

The interest for this project is high and irrigation water management practices implemented to date are already showing indications of water savings.

Seim Ag Technology has provided agricultural remote telemetry applications for central Nebraska farmers and natural resource agencies for eight growing seasons and looks forward to conserving water resources in the Middle Republican NRD.

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

Respectfully,

  
Kenyon Seim  
Seim Ag Technology



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

March 15, 2019

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

Re: Bureau of Reclamation Water Smart Application; **"Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District"**

Dear Mr. Russell:

OTT HydroMet Corporation is glad to be a partner in the project titled "**Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District**". Through our ADCON product offering, OTT HydroMet will provide equipment for ETo weather stations, soil moisture monitoring, 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.

OTT HydroMet provides durable low-maintenance field equipment, a flexible and integrated network, and broad application expertise for irrigation water management and looks forward to partnering with growers, district staff, Seim Ag Technology, and McCrometer on conserving water resources in the Middle Republican NRD.

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

Respectfully,

A handwritten signature in black ink, appearing to read 'Adam Setzler', with a stylized flourish at the end.

Adam Setzler  
OTT HydroMet Corporation

**RESOLUTION OF THE MIDDLE REPUBLICAN NATURAL RESOURCES DISTRICT**

Resolution No. MR-2019-1

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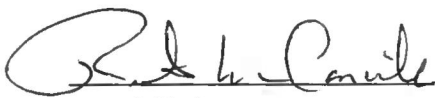
WHEREAS, the Board of Directors agrees that Jack Russell, General Manager of the Middle Republican Natural Resources District, has legal authority to enter into an agreement with the U.S. Bureau of Reclamation to execute provisions of the WaterSMART Water and Energy Efficiency Grant program; and

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

3-12-19  
Date Approved



# Middle Republican Natural Resources District

220 Center  
Curtis, NE 68025  
office@mrnr.org  
(308) 367-1111  
www.mrnr.org

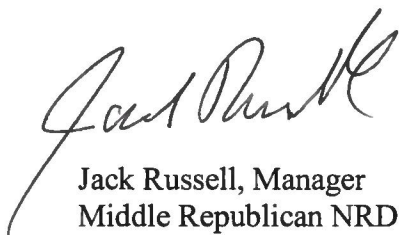
March 15, 2019

To: Bureau of Reclamation  
Financial Assistance Support Section  
Attn: Mr. Darren Olson  
P.O. Box 25007, MS 84-27814  
Denver, CO 80225

Mr. Olson.

Please find the enclosed application for the Funding Opportunity Announcement No. BOR-DO-19-F004 WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2019. The application "Remote Meter Monitoring and Irrigation Water Conservation Project for the Quick Response Area of the Middle Republican Natural Resources District" is an important project for the Republican River Basin.

Thank you for your consideration.



Jack Russell, Manager  
Middle Republican NRD  
Curtis, NE 68025