

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: [Middle Loup Canal Flow Measurement and Recharge Quantification](#)

PRIMARY CONTACT INFORMATION

Entity Name: [Middle Loup Public Power and Irrigation District](#)

Contact Name: [Gerry Sheets](#)

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Phone: [308-789-6401](#)

Email: GerrySheets@hotmail.com

Partners / Co-sponsors, if any: [Click here to enter text.](#)

1. Dollar amounts requested: (Grant, Loan, or Combination)

Grant amount requested. \$ [150,000.00](#)

Loan amount requested. \$ [0](#)

If Loan, how many years repayment period? [N/A](#)

If Loan, supply a complete year-by-year repayment schedule.

[N/A](#)

2. Permits Needed - Attach copy for each obtained (N/A = not applicable)

Nebraska Game & Parks Commission
(G&P) consultation on Threatened and
Endangered Species and their Habitat

[N/A](#) Obtained: YES NO

Surface Water Right

[N/A](#) Obtained: YES NO

USACE (e.g., 404 Permit) N/A Obtained: YES NO

Cultural Resources Evaluation N/A Obtained: YES NO

Other (provide explanation below) N/A Obtained: YES NO
N/A

3. Are you applying for funding for a combined sewer over-flow project?

YES NO

If yes, do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality?

YES NO

If yes attach a copy to your application. N/A

If yes what is the population served by your project? N/A

If yes provide a demonstration of need. N/A

If yes and you were approved for funding in the most recent funding cycle, then resubmit the above information updated annually but you need not complete the remainder of the application.

4. If you are or are representing an NRD, do you have an Integrated Management Plan in place, or have you initiated one?

N/A YES NO

5. Has this application previously been submitted for funding assistance from the Water Sustainability Fund and not been funded?

YES NO

If yes, have any changes been made to the application in comparison to the previously submitted application? N/A

If yes, describe the changes that have been made since the last application.
N/A

No, I certify the application is a true and exact copy of the previously submitted and scored application. (Signature required) N/A

6. Complete the following if your project has or will commence prior to next July 1st.

As of the date of submittal of this application, what is the Total Net Local Share of Expenses incurred for which you are asking cost share assistance from this fund? \$ N/A

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. N/A

Estimate the Total Net Local Share of Expenses and a description of each you will incur between the date of submittal of this application and next July 1st for which you are asking cost share assistance from this fund.
\$ N/A

Section B.

DNR DIRECTOR'S FINDINGS

Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?

YES NO

1(a). If yes (structural), submit a feasibility report (to comply with Title 261, CH 2) including engineering and technical data and the following information:

A discussion of the plan of development (004.01 A);

This project will require the installation of precision flow measurement and control gates and telemetry at locations at the diversion, mid-section check and spill structures of Middle Loup's Canal 3 and Canal 4. The best solution for measuring and controlling flows at each of these locations in the canal network has been recommended by Rubicon's Practicing Engineers, who have undertaken a detailed analysis of the project.

A description of all field investigations made to substantiate the feasibility report (004.01 B);

Drawings of all structures as originally built were provided to Rubicon's Engineers, and a site visit was performed to verify the structure characteristics. The sizing of the gates to be installed is based on the physical dimensions of the existing structures and the required flow capacities in each pool.

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); These supporting documents are contained in the Rubicon Scoping Study which is provided as an attachment to this application.

A description of any necessary water and land rights and pertinent water supply and water quality information, if appropriate (004.01 D);

The Middle Loup Public Power and Irrigation District services approximately 20,500 acres supplied by 125 miles of canals and laterals. The District delivers 18 inches of water per acre to farmers under the following the water right numbers 2293CR for 25.09cfs dated 12-28-1932, 3979CR for 54.13 cfs dated 10-11-1946, 3979CR for 77.41 cfs dated 10-11-1946, 2293DR for 37.16 cfs dated 12-28-1932, 3979DR for 125.41 cfs dated 10-11-1946 and 3979 DR for 24.59cfs dated 10-11-1946.

A discussion of each component of the final plan including, when applicable (004.01 E); This project will involve the installation of precision flow measurement and control gates (SlipMeters and FlumeGates) at

existing structures located on Canals 3 and 4 as follows - Canal 3 Headworks (SM-1200-1200-3000), Canal 3 mile 12.2 (FG-1180-1077), Canal 3 mile 24.5 (FG-1180-866), Canal 4 Headworks (FGB-1790-1587), Canal 4 mile 14.2 (FG-1370-1077) and Canal 4 mile 29.5 (FG-0760-866). The implementation timeframe is mid 2017 for construction and completion. These gates will be connected to telemetry to allow real-time monitoring and logging of flow values past the structures and to allow a corresponding assessment of recharge to be made.

Required geologic investigation (004.01 E 1); No geologic investigation is needed for this project.

Required hydrologic data (004.01 E 2); There is no requirement for hydrological data to undertake this project. This project will provide enhanced hydrological data on Canal 3 and Canal 4 by providing real-time continuous flow measurement of headwork diversions, mid-point flows and canal spills. This information can potentially be used to provide an indication of the recharge rates in these canals.

Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). No extensive civil or structural changes are proposed for this project. The final design is to utilize existing civil infrastructure with an automated gate system, to measure and control flow rates. The installation of the automated control gates into the existing check structures will not modify the structural loading of the upgraded check structures, and so there is no requirement to undertake a structural or foundation assessment on these existing check structures.

- 1(b). If no (non-structural), submit data necessary to establish technical feasibility including, but not limited to the following (004.02):

A discussion of the plan of development (004.02 A);
Click here to enter text.

A description of field or research investigations utilized to substantiate the project conception (004.02 B); Click here to enter text.

A description of the necessary water and/or land rights, if applicable (004.02 C); Click here to enter text.

A discussion of the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D).
Click here to enter text.

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative. The flow measurement and telemetry hardware chosen for this solution is provided by Rubicon Water as complete integrated solutions. Rubicon has now sold more than 20,000 gates and meters in 10 countries, with more than 1,200 installed in the USA. The integrated solution is well established and well tested and we understand that the adoption of a factory configured integrated solution is significantly cheaper than attempting to replicate the functionality using a multitude of other vendors with accompanying interoperability issues. If other flow measurement solutions were used, the overall hardware cost, maintenance requirements, SCADA and integration costs and installation and construction costs would likely be greater. An added benefit to this solution is that the gates can integrate seamlessly into future Total Channel Control projects with very minimal work or cost to exploit these benefits. Therefore, there is no known more economical alternative to accomplishing the same goal.

3. Document all sources and report all costs and benefit data using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies shall be fifty (50) years or with prior approval of the Director, up to one hundred (100) years [T261 CH 2 (005)].
 - Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01). The engineering and inspection functions have already been performed, and all implementation costs have been priced at \$249,665. This price includes any remaining engineering and inspection costs and capital construction costs. The equipment installed in the project is designed with a 30 year economic life and the ongoing maintenance costs are estimated to be less than 2.5% of the up-front capital costs per year. The ongoing telemetry data is provided by a cell-modem based solution called SCADA Connect with a data service cost for all sites of \$4,100 per year. These ongoing maintenance and data costs are largely offset by reduced vehicular and operations costs. The estimated construction period is 2 months commencing November 2017, and the estimated economic life of the installed equipment is 30 years.
 - Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the

project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe any intangible or secondary benefits separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, such that the economic feasibility of the project can be approved by the Director and the Commission (005.02). The primary tangible benefit resulting from this project will be knowledge of the flow rates in Canal 3 and Canal 4 with resultant improved knowledge of recharge rate in the canal and a real time measurement of spill out the end of each of the two canals. The real-time water level and flow information provided will also assist with better operation of these canals to reduce waste and potentially retain more flow in the Sherman Feeder Canal and the Middle Loup River. These benefits will accrue over the full economic life of the project – which is expect to be 30 years.

- All benefit and cost data shall be presented in a table form to indicate the annual cash flow for the life of the proposal, not to exceed 100 years (005.03). The project is not primarily intended to generate revenue – Middle Loup’s main interest with this project is to be sustainable with the basin’s water supply going forward. The project is designed to be implemented in one year so that the full benefits of water savings can be realized in the first year following the winter construction program. Accordingly, the full project budget of \$249,665 will be spent within the first year, and the full project benefits will accrue equally over the 30 year economic life of the project.
- In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, the economic feasibility of such proposal shall be demonstrated by such method as the Director and the Commission deem appropriate (005.04). This project will increase water sustainability by allowing control of water flows more precisely than previous methods and will provide new data for quantifying recharge rates and operational spills. Additional benefits include the remote operation of the gates which means that the system operator no longer needs to travel to site to change flow setpoints. This reduces OH&S risk, frees up the time that would normally be spent driving to site and creates fuel cost savings for the district. The new information provided by accurate flow measurement will allow canal diversions to more closely match water requirements, helping to increase in-stream flows in the Middle Loup compared to the previous method of inaccurate flow measurement and control.

4. Provide evidence that sufficient funds are available to complete the proposal. The Middle Loup Public Power and Irrigation District has a contract with farmers to supply water which is charged to users. The

remaining funds beyond this grant application are \$100,000 which the District will pay for with in-kind contributions and annual revenues.

5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace).

The 2016 Budget for the District is attached. Also included is the current Financial Statement showing additional funds. However, those funds are not expected to be utilized for this project

6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.
No loan is involved.

7. Describe how the plan of development minimizes impacts on the natural environment.

The plan of development will avoid any impact on the natural environment by ensuring the following: Civil construction works will involve minimal modification to existing concrete structures and will not require excavation or moving of earth; No chemicals will be released into soils or waterways as a part of these works; The solution is a zero energy solar powered solution which will not create green-house gas emissions; The regulation of canal flows and water levels remotely via remote telemetry reduces vehicular usage and associated exhaust emissions and road infrastructure wear and tear.

8. Explain how you are qualified, responsible and legally capable of carrying out the project for which you are seeking funds.

Middle Loup Public Power and Irrigation District has an existing water right, existing facilities to work with, and annual budgets to fund the work – and hence is qualified, responsible and legally capable of carrying out the project. The board of Middle Loup Public Power is elected to make decisions for the benefit of water users and has the authority to undertake this work in accordance with the powers of the Board.

9. Explain how your project considers plans and programs of the state and resources development plans of the political subdivisions of the state.

This project will provide additional information which can assist the Department of Natural Resources to provide its monthly reports. The Middle Loup Irrigation District monitors on a daily basis the river diversions from the Middle Loup River. It monitors the canal and lateral diversions and monitors the farm turnout diversions. The Department of Natural Resources has measuring devices that are read by State officials as well. The Department based upon those readings, provides a monthly report. All of the information is used as a part of the annual report done by

the Department of Natural Resources and eventually can be used in regard to State Water Planning activities

10. Are land rights necessary to complete your project?

YES NO

If yes, provide a complete listing of all lands involved in the project.

N/A

If yes, attach proof of ownership for each easements, rights-of-way and fee title currently held.

N/A

If yes, provide assurance that you can hold or can acquire title to all lands not currently held.

N/A

11. Identify how you possess all necessary authority to undertake or participate in the project. [The Middle Loup Public Power and Irrigation District is governed by a Board of Directors that oversee the best interests of the District and their water users. The Statutes within the State of Nebraska give the authority to the District to make these types of decisions.](#)
12. Identify the probable environmental and ecological consequences that may result as the result of the project. [There are no consequences identified as a result of this project. Only positive environmental benefits will be yielded through improved water quality and quantity, while providing those benefits for Nebraska's ecosystem.](#)

Section C.

NRC SCORING

In the NRC's scoring process, points will be given to each project in ranking the projects, with the total number of points determining the final project ranking list.

The following 15 criteria constitute the items for which points will be assigned. Point assignments will be 0, 2, 4, or 6 for items 1 through 8; and 0, 1, 2, or 3 for items 9 through 15. Two additional points will be awarded to projects which address issues determined by the NRC to be the result of a federal mandate.

Notes:

- The responses to one criterion will not be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.
- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted in parenthesis. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.
- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

Complete any of the following (15) criteria which apply to your project. Your response will be reviewed and scored by the NRC. Place an N/A (not applicable) in any that do not apply, an N/A will automatically be placed in any response fields left blank.

1. Remediates or mitigates threats to drinking water;
 - Describe the specific threats to drinking water the project will address.
 - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
 - Provide a history of issues and tried solutions.
 - Provide detail regarding long range impacts if issues are not resolved.

This project will help improve water quality and river health by providing spill information which will enable future management decisions to assist in reducing this spill. As diverted water makes its way through the canal system,

it has increased exposure to contamination by animal contact, aquatic vegetation control chemicals, on-farm practices and many others. This project will alarm when spill is occurring so that manual intervention can be made to attempt to reduce the spill. The improved quality and quantity of the basin will be shared by any municipality, domestic, or agricultural Stakeholders in Nebraska.

2. Meets the goals and objectives of an approved integrated management plan or ground water management plan;
 - Identify the specific plan that is being referenced including date, who issued it and whether it is an IMP or GW management plan.
 - Provide the history of work completed to achieve the goals of this plan.
 - List which goals and objectives of the management plan the project provides benefits for and how the project provides those benefits.

The Lower Loup NRD adopted a Voluntary IMP in March 2016. The Department of Natural Resources completed the process of the IMP in July, 2016. The NRD had public meetings with stakeholders from throughout the NRD participating in the process prior to the adoption of the Voluntary IMP in March. The goals are to provide a long term plan for the integrated use of surface and groundwater for the overall benefit of the river basin. Knowledge of system spill as a fraction of diversions will help make investment decisions to achieve the goals and objectives of the IMP by helping to quantify recharge rates and helping to quantify the opportunity to maintain instream flows by reducing canal spill.

3. Contributes to water sustainability goals by increasing aquifer recharge, reducing aquifer depletion, or increasing streamflow;

List the following information that is applicable:

- The location, area and amount of recharge;
- The location, area and amount that aquifer depletion will be reduced;
- The reach, amount and timing of increased streamflow. Describe how the project will meet these objectives and what the source of the water is;
- Provide a detailed listing of cross basin benefits, if any.

This project will contribute useful information about recharge rates in the Middle Loup Public Power and Irrigation District's Canals 3 and 4 and useful information about the opportunity to utilize spilled water for increased instream flows or to provide additional recharge. Automated gates are proposed to be placed at the headworks, mid point and spill structure of both of these canals. The inflow information at the three locations on each canal will assist in determining the recharge rate along the length of the canal and will provide information about how this recharge rate increases with increasing canal depths which could be achieved with further automation. The opportunity to increase streamflow in the

parallel stretches of the Middle Loup River will also be established through real-time verification of operational spill. The project will help to make management decisions to ensure that more water stays in the Sherman Feeder Canal, making more water available for Sherman Reservoir and increasing the recharge created by the reservoir.

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;
 - List the goals the project provides benefits.
 - Describe how the project will provide these benefits
 - Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

The project will contribute to multiple water supply goals including stream augmentation, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources.

1. Flood Control - The ability to remotely control the flow control gates means that operational capability can be maintained when flood waters restrict vehicular access. This allows more capability to respond to flood events by maintaining the capability to operate structures when local access is not possible. The solution's water-tight gates can be used to run specific sections of canals deeper for longer and therefore provide targeted recharge, increasing the rate at which surface water is transferred to the aquifer. This can provide the capability to back water up and increase the rate of groundwater recharge to reduce the volume of water downstream.
2. Agricultural Use - The proposed solution will provide valuable data to support the case for automation of the canals which when implemented would make more surface water available longer through the growing season and thereby extend water availability and resultant crop yields. The solution will assist in management decisions which will result in more water staying in the Sherman Feeder Canal which will increase the availability of water in Sherman Reservoir for the benefit of water users.
3. Municipal and Industrial Uses – The proposed solution will provide valuable data to support the case for automation of the canals which when implemented would make more surface water available and reduce the need for river diversions and groundwater pumping – thereby increasing instream flows and reducing aquifer depletion. The ability to keep more water in the Sherman Feeder Canal will allow more water to be supplied to Sherman Reservoir. Water quality and river health improvements are achieved by minimizing the spill of irrigation water back into the river.
4. Recreational Benefits - retaining more water in storage will sustain storage levels with resultant recreational benefits for reservoir users. This will benefit all recreational users of Sherman Reservoir. Additional recreational benefits are provided by the ability to retime storage releases so that more water is available when the river flows are

reduced, providing benefit to recreational river users. 5. Wildlife Habitat - increased stored water availability reduces the need for river diversions and groundwater pumping. This will assist migratory bird species and other wildlife that relies on abundant water availability. Water quality and river health improvements are achieved by minimizing the spill of irrigation water back into the river. River flows are also increased along the reaches parallel to irrigation districts, with associated environmental benefits. 6. Conservation of Water Resources - Better management and use of Sherman Reservoir makes more water available to the river system in times of water scarcity – thereby conserving water resources. The opportunity to quantify recharge opportunities along the length of Canal 3 and Canal 4 will also provide opportunity to conserve aquifer volume and groundwater availability in the region. 7. Preservation of Water Resources - The ability to make more informed operating decisions to increase flows into Sherman Reservoir allows more stored water to be banked for future dry years, thereby preserving the water resource. In addition, the ability to enhance groundwater recharge in wet years preserves groundwater resources.

5. Maximizes the beneficial use of Nebraska's water resources for the benefit of the state's residents;

- Describe how the project will maximize the increased beneficial use of Nebraska's water resources.
- Describe the beneficial uses that will be reduced, if any.
- Describe how the project provides a beneficial impact to the state's residents.

The project will increase the beneficial use of Nebraska's water resources by providing more information to assist with the efficient operation of the Sherman Feeder Canal to make more stored surface water available for downstream users. The project will also provide valuable information about the recharge rates along Canals 3 and 4 and the ability to maximize these by operating the canals at a deeper level. Information about canal spill will also provide important information to support decisions to automate these canals. No beneficial uses of water will be reduced, beneficial uses will only be increased. By creating additional stream flow and information about recharge, there is potential for more recreational opportunities, more ground water recharge for all pumping users, a more consistent domestic supply, additional irrigation and agricultural opportunity, and increasing habitat for all species along the stream. A full implementation of this project will benefit all of these users who depend on this water, and will affect an area of the State, starting in northeast Custer County, all the way through Lincoln and Omaha to the Missouri River. This impacts heavily populated communities along the Middle Loup River, the Loup River, and part of the Platte River, which cuts through a large portion of Nebraska. The project will provide improved water quality for downstream users and accompanying improvements in river health - water quality and river health improvements are achieved by providing information to allow a reduction in the spill of irrigation water back into the river. River flows are also increased along

the reaches parallel to irrigation districts, with associated environmental benefits. The project provides a beneficial impact to the state's residents by sustaining agricultural yields, increasing instream flows to downstream users, ensuring cleaner water flows to downstream users, and reducing the requirement to pump groundwater with resultant reductions in greenhouse emissions and reduced load on electricity infrastructure.

6. Is cost-effective;

- List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.
- Compare these costs to other methods of achieving the same benefits.
- List the costs of the project.
- Describe how it is a cost effective project or alternative.

The estimated construction cost of this project is \$249,665. The outcome will be better information about the recharge rates in Canals 3 and 4 and the unintended operational spill from these canals. This information will support decisions on automation of these canals to eliminate system spill and run the canals deeper to enhance recharge during wet years. The O&M costs over the 30 year asset life of this solution are estimated at less than 2.5% of the capex – or less than \$6,241 per year. These O&M costs are expected to be largely offset by a reduction in existing costs such as vehicular usage and other operational costs. There are no land or water acquisition costs involved in this project. The flow measurement and telemetry hardware chosen for this solution is provided by Rubicon Water as complete integrated solutions. Rubicon has now sold more than 20,000 gates and meters in 10 countries. The integrated solution is well established and well tested and we understand that the adoption of a factory configured integrated solution is significantly cheaper than attempting to replicate the functionality using a multitude of other vendors with accompanying interoperability issues. If other flow measurement solutions were used, the overall hardware cost, maintenance requirements, SCADA and integration costs and installation and construction costs would likely be greater. An added benefit to this solution is that the gates can integrate seamlessly into future Total Channel Control projects with very minimal work or cost to exploit these benefits. Therefore, there is no known more economical alternative to accomplishing the same goal. The economics of canal automation have been established over more than a decade and have resulted in this solution being adopted as the preferred solution in many large scale implementations in Australia, California (Oakdale Irrigation District, Turlock Irrigation District, Solano Irrigation District), Washington (Naches Selah Irrigation District), Arizona (PIMA Maricopa Irrigation District), and other Western States. In a time that water is becoming more valuable, the cost/benefit ratio will consistently increase. The construction costs to build a project will also consistently increase. Funding this project will have benefits far into the future with minimal annual cost.

7. Helps the state meet its obligations under interstate compacts, decrees, or other state contracts or agreements or federal law;

- Identify the interstate compact, decree, state contract or agreement or federal law.
- Describe how the project will help the state meet its obligations under compacts, decrees, state contracts or agreements or federal law.
- Describe current deficiencies and document how the project will reduce deficiencies.

The Middle Loup River is a constant source of water to the Platte River as a main tributary. Federal laws such as the Endangered Species Act to protect the Pallid Sturgeon in the Lower Platte would benefit from this project. The Clean Water Act and the Safe Drinking Water Act will potentially benefit as well from additional water flows to the Lower Platte. The Endangered Species Act, the Clean Water Act and the Safe Drinking Water Act are federal laws that would benefit as a result of this project. The data provided by this project would help document the ongoing benefits that can be provided by canal control automation to secure water sustainability within the basin.

8. Reduces threats to property damage or protects critical infrastructure that consists of the physical assets, systems, and networks vital to the state or the United States such that their incapacitation would have a debilitating effect on public security or public health and safety;

- Identify the property that the project is intended to reduce threats to.
- Describe and quantify reductions in threats to critical infrastructure provided by the project and how the infrastructure is vital to Nebraska or the United States.
- Identify the potential value of cost savings resulting from completion of the project.
- Describe the benefits for public security, public health and safety.

This project will monitor and control the flows and water levels at locations on Canal 3 and Canal 4 continuously and protect property located along and downstream of these canals from potential flood damage that can occur as a consequence of storm events or power outages which shut down large numbers of pivots. The continuous management of the canal flows means that any flow that enters the canal from runoff events or a power outage that causes widespread shut off of pivots will be better able to be safely passed downstream through the system. This will help to protect the investment made in the canal infrastructure of the Middle Loup Irrigation District should extreme events such as heavy rain or power outages occur. An unmanaged system during a major rain event or power outage can see high levels in the canal system, causing significant erosion and wash out of critical infrastructure while causing additional harm to lands that experience

resulting flooding, and interruption of the irrigation supply downstream of the washout with serious economic consequence. This project has real-time telemetry that provides alarms of high water conditions within seconds and provides these alarms to appropriate response teams by text message, phone call or email. These early warnings and alarms provide opportunity to minimize threats to property damage and protect critical infrastructure.

9. Improves water quality;

- Describe what quality issue(s) is/are to be improved.
- Describe and quantify how the project improves water quality, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
- Describe other possible solutions to remedy this issue.
- Describe the history of the water quality issue including previous attempts to remedy the problem and the results obtained.

This project will provide real-time measurement of water spilled from the ends of Canals 3 and 4, allowing manual intervention to reduce these spills. Water quality and river health improvements are achieved by reducing the spill of irrigation water back into the river. As diverted water makes its way through the canal system, it has increased exposure to contamination by animal contact, aquatic vegetation control chemicals, on-farm practices and many other sources. Reducing spill from the end of the canal network helps to prevent these contaminants from being introduced to the river. The project will improve the water quality for downstream users and provide accompanying improvements in river health. This project is capable of impacting water quality of a large portion of the State and its water supply far into the future. This project will benefit all of these users who depend on this water across an area of the State, starting in northeast Custer County, all the way through Lincoln and Omaha to the Missouri River. This impacts heavily populated communities along the Middle Loup River, the Loup River, and part of the Platte River, which cuts through a large portion of Nebraska.

10. Has utilized all available funding resources of the local jurisdiction to support the program, project, or activity;

- Identify the local jurisdiction that supports the project.
- List current property tax levy, valuations, or other sources of revenue for the sponsoring entity.
- List other funding sources for the project.

The Middle Loup Public Power and Irrigation has the authority, through Board action, to increase its water rates per acre for a long term bond. This District has 20,084 acres and could increase their rates per acre to pay the bond

annually. In addition, the District could work with the Lower Loup NRD in regard to financial assistance.

11. Has a local jurisdiction with plans in place that support sustainable water use;

- List the local jurisdiction and identify specific plans being referenced that are in place to support sustainable water use.
- Provide the history of work completed to achieve the goals of these plans.
- List which goals and objectives this project will provide benefits for and how this project supports or contributes to those plans.
- Describe and quantify how the project supports sustainable water use, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
- List all stakeholders involved in project.
- Identify who benefits from this project.

The local Middle Loup Public Power and Irrigation District has worked very hard through the years to become more efficient and sustain a water supply for downstream users. The conversion of 74 miles of open lateral systems to pipeline is now nearly complete with only a few miles to complete this coming fall. This represents a previous investment by the district over more than \$2,122,000. Reflecting on what has been done and what can be done moving forward, technology and automation allows the conservation efforts implemented on smaller laterals to be extended to our main canals. A description of how the project supports sustainable water use is provided in the response to Question 4 and Question 5. A list of parties that will benefit from this project is provided in the responses to Question 4 and Question 5. By increasing efficiencies within our Irrigation Districts, our water can be better managed to make more water available in the River at times of shortage late in the season, and increase the sustainability of our water supply into the future. This increased water supply will be utilized by any ground water or surface water user around and along the Middle Loup, Loup, and Lower Platte Rivers, crossing largely populated communities and multiple recreation and agricultural beneficiaries.

12. Addresses a statewide problem or issue;

- List the issues or problems addressed by the project and why they should be considered statewide.
- Describe how the project will address each issue and/or problem.
- Describe the total number of people and/or total number of acres that would receive benefits.
- Identify the benefit, to the state, this project would provide.

Water scarcity has been a problem for Nebraska in the past, with severe droughts impacting the State. The improvement of quality and quantity issues

will help the State better respond to future drought events. Because the Middle Loup, Loup, and Lower Platte Rivers impact such a large part of the State, this project could be beneficial for hundreds, if not millions of domestic and agricultural users in Nebraska.

13. Contributes to the state's ability to leverage state dollars with local or federal government partners or other partners to maximize the use of its resources;

- List other funding sources or other partners, and the amount each will contribute, in a funding matrix.
- Describe how each source of funding is made available if the project is funded.
- Provide a copy or evidence of each commitment, for each separate source, of match dollars and funding partners.
- Describe how you will proceed if other funding sources do not come through.

The Middle Loup Public Power and Irrigation District will contribute through in-kind work and needed financial resources to complete its 40 percent match.

14. Contributes to watershed health and function;

- Describe how the project will contribute to watershed health and function in detail and list all of the watersheds affected.

The water sheds to be affected is the majority of the Middle Loup River, all of the Loup River and the Lower Platte River. By measuring actual flows through the canals we are better able to match these to demand and operational spills will be reduced, leaving more water in the river and retained in Sherman Reservoir for later availability to farmers. In addition to making more water available for longer in the season, the prevention of these loss components will effectively increase the capacity of the system. By reducing unmanaged spill more water can be supplied to Sherman Reservoir to be made available to users at their time of need later in the season. Improved water quality for downstream users and accompanying improvements in river health are achieved by reducing the spill of irrigation water back into the river. This water travels through hundreds of miles of canals, therefore exposed to a multitude of contaminants; such as animal feces, aquatic pesticides, on farm chemicals, and many others.

15. Uses objectives described in the annual report and plan of work for the state water planning and review process issued by the department.

- Identify the date of the Annual Report utilized.
- List any and all objectives of the Annual Report intended to be met by the project
- Explain how the project meets each objective.

The District monitors on a daily basis all river diversions, canal and lateral diversions as well as farm turnout diversions. The Department of Natural Resources has measuring devices that are read by State officials. All the information recorded by the District is available to the public. In addition, the Department of Natural Resources provides monthly reports as well as annual report of water usage. This project will provide enhanced flow measurement and recharge data to assist in meeting the measurement and reporting objectives of the Department of Natural Resources.

16. Federal Mandate Bonus. If you believe that your project is designed to meet the requirements of a federal mandate which furthers the goals of the WSF, then:

- Describe the federal mandate.
- Provide documentary evidence of the federal mandate.
- Describe how the project meets the requirements of the federal mandate.
- Describe the relationship between the federal mandate and how the project furthers the goals of water sustainability.

The Pallid Sturgeon fish is an endangered species in the Lower Platte. The federal mandate is to protect that fish from extinction. The water saved by this project will assist in the protection of that species. The same can be said for the Clean Water Act and the Safe Drinking Water Act which are federal mandates and the water saved could only assist with those mandates.

Section D.

PROJECT DESCRIPTION

1. Overview

In 1,000 characters or less, provide a brief description of your project including the nature and purpose of the project and objectives of the project.

The Middle Loup Canal Flow Measurement and Recharge Quantification project will undertake the installation of precision flow measurement and control gates at the diversion, mid-section and spill structures of Middle Loup's Canal 3 and Canal 4. These gates will be connected to telemetry to allow real-time monitoring and logging of flow values past the structures and to allow a corresponding assessment of recharge to be made. This project will provide knowledge of the flow rates in Canal 3 and Canal 4 with resultant improved knowledge of recharge rate in the canal and a real time measurement of spill out the end of each of the two canals. The new information provided by accurate real-time flow measurement will help quantify recharge rates and operational spills and will allow canal diversions to more closely match water requirements. This will help to increase in-stream flows in the Middle Loup and provide more water to fill Sherman Reservoir. The real-time water level and flow information provided will assist with better operation of these canals to reduce waste and potentially retain more flow in the Middle Loup River.

2. Project Tasks and Timeline

Identify what activities will be conducted by the project. For multiyear projects please list what activities are to be completed each year.

The project construction involves the installation of automated flow control gates and an accompanying telemetry link. This project is expected to take three months to complete. The project will involve the preparation of concrete check structures and installation of control gates, communications, hardware, software, and training.

3. Partnerships

Identify the roles and responsibilities of agencies and groups involved in the proposed project regardless of whether each is an additional funding source. List any other sources of funding that have been approached for project support and that have officially turned you down. Attach the rejection letter.

Last year the Lower Loup NRD approved supporting a full scale Total Channel Control implementation project when it involved multiple Irrigation

Districts. Since this application has been redone to include only measurement for two canals in the one District, an official proposal has not yet been re-introduced to them.

4. Other Sources of Funding

Identify the costs of the entire project, what costs each other source of funding will be applied to, and whether each of these other sources of funding is confirmed. If not, please identify those entities and list the date when confirmation is expected. Explain how you will implement the project if these sources are not obtained.

This grant request for \$150,000 is for 60% of the expected project value of \$249,665. The remainder is \$99,665 which will be provided from the Middle Loup Irrigation District budget if additional funds from other stakeholders aren't received.

5. Support/Opposition

Discuss both support and opposition to the project, including the group or interest each represents.

The LLNRD, LPNNRD and LPSNRD have all expressed interest in the larger multi-district proposal defined the accompanying Rubicon Scoping Study. This project is a subset of the work that has been presented to these NRDs.