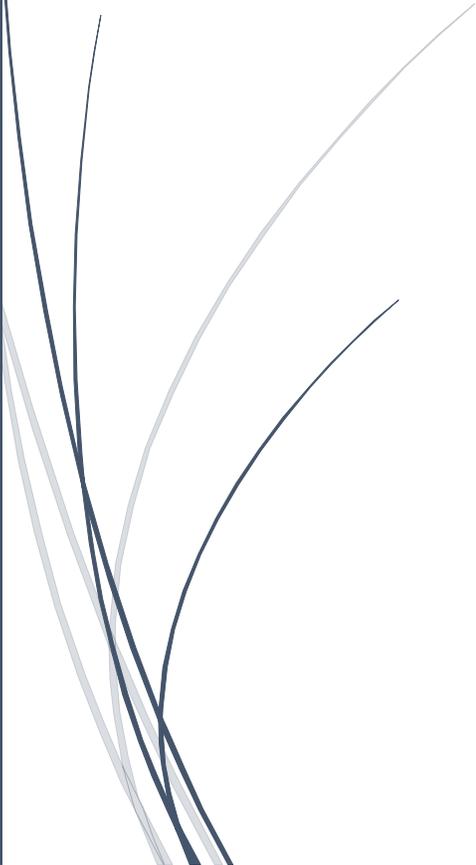




July, 2021

Application for Funding

Water Sustainability Fund
Nebraska Natural Resources
Commission



Middle Loup Public Power and Irrigation District
Gerry Sheets, Manager
140 S. Fonner Street, Arcadia, NE 68815
308-789-6401



Table of Contents

	<u>Pages</u>
1. Grant Application	2 - 25
2. Appendix Index (Appendices attached separately to grant application)	26

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Middle Loup Public Power and Irrigation District Flow Measurement and Canal Efficiency Project

SPONSOR'S PRIMARY CONTACT INFORMATION (Not Consultant's)

Sponsor Business Name: Middle Loup Public Power and Irrigation District (MLPPID)

Sponsor Contact's Name: Gerry Sheets

Sponsor Contact's Address: 140 S. Fonner St., P.O. Box 37, Arcadia, NE 68815

Sponsor Contact's Phone: (308) 789-6401 Cell: (308) 202-0123

Sponsor Contact's Email: gerrysheets@hotmail.com

1. **Funding** amount requested from the Water Sustainability Fund:

Grant amount requested. \$ 850,837

- If requesting less than 60% cost share, what %? ~30% share requested, see forthcoming detail.

If a loan is requested amount requested. \$ 0

- How many years repayment period? n/a
- Supply a complete year-by-year repayment schedule. n/a

2. **Neb. Rev. Stat. § 2-1507 (2)**

Are you applying for a **combined sewer overflow 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
- Attach a copy to your application. [Click here to enter text.](#)
- What is the population served by your project? [Click here to enter text.](#)
- Provide a demonstration of need. [Click here to enter text.](#)
- **Do not complete the remainder of the application.**

3. **Permits Required/Obtained** Attach a copy of each that has been obtained. For those needed, but not yet obtained (box “NO” checked), 1.) State when you will apply for the permit, 2.) When you anticipate receiving the permit, and 3.) Your estimated cost to obtain the permit.

(N/A = Not applicable/not asking for cost share to obtain)
(Yes = See attached)
(No = Might need, don't have & are asking for 60% cost share to obtain)

G&P - T&E consultation (required)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
DNR Surface Water Right	N/A <input type="checkbox"/>	Obtained: YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
USACE (e.g., 404/other Permit)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
FEMA (CLOMR)	N/A <input type="checkbox"/>	Obtained: YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Local Zoning/Construction	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Cultural Resources Evaluation	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Other (provide explanation below)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>

N/A

4. **Partnerships**

List each Partner / Co-sponsor, attach documentation of agreement:

- 1) [FEMA \(See Appendix 1\)](#)
- 2) [Lower Loup NRD \(See Appendix 1\)](#)

Identify the roles and responsibilities of each Partner / Co-sponsor involved in the proposed project regardless of whether each is an additional funding source.

FEMA - Funding Partner - (as a result of 2019 ice flow damage). FEMA has agreed to allocate a total of \$2.7M in funds from District-owned bridge to beneficial use for the district; In order to qualify for the funding, MLPPID needs to provide 25% matching funds (\$675,000). The Middle Loup Board has agreed to invest up to \$2M in Canal Automation (\$500,000 > 25% matching funds) for Canals 3 and 4. (See Appendix 1)

Lower Loup NRD (LLNRD) - Funding Partner- MLPPID submitted a proposal to the Lower Loup NRD and their committee has agreed to recommend a \$100,000 grant to help fund MLPPID's canal automation and water conservation efforts. (See Letter of Support in Appendix 1 and 5)

Between these two sources of outside funding (FEMA including matching funds) and LLNRD, the district has already developed \$2.1M in funding for this project.

5. **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.

Estimated Costs & Sources of Funding - Canal Automation MLPPID

<u>Estimated Costs</u>		
MLPPID Canal 3 / Key Gates at beginning of Canal 4	\$2,950,837	
<u>Estimated Sources of Funding for Canal Automation</u>		
FEMA funding (from Ice Flow Damage)	\$ 1,500,000	Source of Funding Confirmed? YES
MLPPID Funding (bond sales - 25% of FEMA money [required])	\$ 500,000	YES
LLNRD funding	\$ 100,000	YES
Total Funding	<u>\$2,100,000</u>	

Additional Funding Needed (Estimated Costs minus Estimated Sources of Funding)	\$ 850,837
--	-------------------

This project can and will be implemented in phases--with each phase adding to the water efficiency--so a complete "build out" is not absolutely required to yield significant benefits from the project.

6. **Overview**

In 1,000 words or less, provide a brief description of your project including the nature/purpose of the project and its objectives. Do not exceed one page!

This project will involve the installation of precision flow measurement and control gates at 36 existing structures located on Canal 3 and the initial key gate structures on Canal 4. Over 60 automated gates will be installed; some structures require more than one gate per site. These gates will be connected to telemetry (Radio System / SCADA) to allow real-time monitoring, logging and controlling of water flow past the structures. Automation of Canals 3 and 4 within the Middle Loup Public Power and Irrigation District (MLPPID) offers a multitude of benefits to the District and Area including conservation and increased availability of water resources for agricultural and municipal uses, flood control, improved wildlife habitat and recreational benefits. The automation (or "Network Control Solution") of Canals 3 and 4 upgrades existing canal infrastructure to allow the regulation equipment to precisely match supply with demand at all points through the canal network. All check structures along the length of the canal system are coordinated so that water levels remain stable while just the amount of water needed is supplied from the dam or river. The canal system behaves with nearly the same responsiveness and efficiency as a pipe system but without the costs of pipe systems. The Network Control solution installs automated regulator gates, a data-radio network, canal network control software and a remote monitoring and management platform to assist irrigation district management to achieve new levels of customer service and distribution system efficiencies. 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.

7. **Project Tasks and Timeline**

In order to accommodate the new automated gates, some minor civil work will need to be completed such as pouring center piers and cutting concrete. These tasks will be completed utilizing internal District resources (labor and equipment) which will help reduce capital outlays. However, due to limited personnel, these civil works will be completed in due course with other existing seasonal responsibilities.

For multiyear projects please list (using the following example):

<u>Tasks</u>	<u>Year 1\$</u>	<u>Year 2\$</u>	<u>Year 3\$</u>	<u>Remaining</u>	<u>Total \$ Amt.</u>
Permits	\$18,000				\$18,000
Engineering		\$96,000			\$96,000
Construction		\$87,000	\$96,000		\$183,000
Close-out				\$8,000	\$8,000
				TOTAL	\$305,000

- What activities (Tasks) are to be completed.
- An estimate of each Tasks expenditures/cost per year.
- Activities in years 4 through project completion under a single column.

Please see table below:

Project Tasks and Timeline

		<u>Year 1\$</u>	<u>Year 2\$</u>	<u>Year 3\$</u>	<u>Total</u>
		<u>2021-22</u>	<u>2022-23</u>	<u>2023-24</u>	
<u>Tasks</u>	<u>Comments</u>	<u>Canal 3</u>	<u>Canal 3/ Canal 4 to Msmt Point</u>	<u>Remaining Activities</u>	
Modifications of Existing Civil Works to retrofit Automated Gates	Estimate 1 location per week for 25 weeks	\$ 75,000	\$ 75,000	\$ 33,000	\$ 183,000
Purchase of Automated Gates	All FEMA \$ required to be spent in year 1	\$ 1,978,825			\$1,978,825
Installation of Gates and SCADA (Server and Communication Tower(s))		\$ 544,512	\$ 244,500		\$ 789,012
TOTALS		\$2,598,337	\$ 319,500	\$ 33,000	\$2,950,837

8. **IMP**

Do you have an **Integrated Management Plan** in place, or have you initiated one? YES NO Sponsor is not an NRD

Section B.

DNR DIRECTOR'S FINDINGS

Prove Engineering & Technical Feasibility

(Applicant must demonstrate compliance with Title 261, CH 2 - 004)

1. Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?
YES NO

If you answered "YES" you must answer all questions in section 1.A.
If you answer "NO" you must answer all questions in section 1.B.

If "YES", it is considered mostly structural, so answer the following:

- 1.A.1 Insert a feasibility report to comply with Title 261, Chapter 2, including engineering and technical data; See attached summary of project (Appendix 2) with recommended gates and communication equipment. Both a long and short version is attached. FEMA requested the short version.
- 1.A.2 Describe the plan of development (004.01 A); This project will require the installation of precision flow measurement and control gates and telemetry at operational gate locations of Middle Loup's Canal 3 and key initial gates on Canal 4. The solution for measuring and controlling flows at each of these locations in the canal network has been recommended by Rubicon's (Automated Gate Supplier) Engineers, who have undertaken a detailed analysis of the project.
- 1.A.3 Include 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 (Gate and telemetry supplier) Engineers and several site visits were 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.
- 1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); See attached summary of project (submitted to FEMA-Appendix 2) with recommended gates and communication equipment.
- 1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (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.

- 1.A.6 Discuss each component of the final plan (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. The project will use existing District personnel for cost management and containment. District personnel will undertake modifying each existing structure including cutting concrete and pouring center mounting piers. It is expected that modification of each structure will take an average of 1 week (dependent on the structure) and that installation of gates at each location will occur thereafter. Additional activities will include installation of a radio network (and needed communication towers) concurrently with the structure work. This process is expected to occur over a span of 3 years from beginning to end. (Fall 2021 -Spring 2024).
- 1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); No geologic investigation is needed for this project.
- 1.A.8 When applicable include the hydrologic data investigation required for the project (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.
- 1.A.9 When applicable include the 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.

If “NO”, it is considered mostly non-structural, so answer the following:

- 1.B.1 Insert data necessary to establish technical feasibility (004.02); Click here to enter text.
- 1.B.2 Discuss the plan of development (004.02 A); Click here to enter text.

- 1.B.3 Describe field or research investigations utilized to substantiate the project conception ([004.02 B](#)); [Click here to enter text.](#)
- 1.B.4 Describe any necessary water and/or land rights ([004.02 C](#)); [Click here to enter text.](#)
- 1.B.5 Discuss 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.](#)

Prove Economic Feasibility

(Applicant must demonstrate compliance with Title 261, CH 2 - 005)

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 35,000 gates and meters in 15 countries with numerous gates in Nebraska. Rubicon has invested in Nebraska-based support and now has a Technician and Canal Operation Specialist located in the State for local support. The integrated solution is well established and well-tested. Rubicon's product offering is a factory configured integrated solution, which ultimately is more economical 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 is the project life, up to fifty (50) years; or, with prior approval of the Director up to one hundred (100) years, ([Title 261, CH 2 - 005](#)). There are a host of benefits that have been identified by pursuing a Canal Automation Project at MLPPID. Here is a summary:
 - 1) Water Conservation: Estimated water savings from canal automation has been estimated using two different models: (Refer to Appendix 3) a) A 18% "Non-Beneficial Diversion Consumptive Use" and b) Case Study Analysis from other Irrigation Districts utilizing automation. For the Non-Beneficial Consumptive Use Model, the USBR determined in the 1930's "DPR" (Definitive

Plan Report / Republican River, NE) that 18% of water diverted from a natural source to a canal results in ~18% loss for non-beneficial use due to plant growth along canal banks and evaporative losses. Using this model, estimated Water Savings for Canal 3 & 4 automation are estimated at 1100 AF Annually. On average over the past 4 years, approximately 31.4k AF is diverted to MLPPID with an estimated 6k AF returned through spills and wasteways. By using canal automation, canal supply (i.e. water diverted) can match canal demand eliminating spill and associated loss. Based on this, an estimated 1,100 AF could be saved. This is calculated as follows: Total canal diversion = 31,400 AF - 6,000 AF (Total spills and returns from wasteways) = ~25,400AF. So: the diversion with canal automation would be 6,000 AF less water in the canal. This would equal approximately 1,100 AF Water Savings (6,000 X 18% = 1080 A.F) saved.

b) Alternatively the "Canal Efficiency" Model compares current water diverted vs. the District water allotment per acre (18" per acre or 1.5 AF) and calculates a current efficiency number. That number is then compared to a 90% target. This calculation (see Appendix 3) shows Canal 3 is currently operating at about 68% efficiency and Canal 4 close to 75% efficiency). By raising operational efficiency to 90% through automation, it is possible that the project could save over 6,000 AF annually upon full implementation on Canals 3 and 4.

Ultimately, a canal with automated gates constantly adjusting allows much more precise utilization of water than is possible with a manual system that is adjusted 1-2 times per day--This water can remain in the stream for downstream users in the Platte River basin (including municipal & industrial applications).

2) Economic Resilience - Agriculture is the primary industry in Sherman County. The impact of water on crop yields and value can be shown by examining the crop yield in 2012 (a VERY water-short year) on dryland crops. (Irrigated crop yields in 2012 were not significantly impacted) For instance, the 5-year total dryland corn yield average in Sherman County is approximately 2.3M bushels, valued at ~\$8.5M (2021 prices); in 2012, in 2012, yields fell to 323k bushels, valued at \$1.175M, a loss of \$7.3M. For Soybeans, the 5-year total dryland soybean yield average in Sherman County is approximately 430k bushels, valued at ~\$4.1M (2021 Prices); in 2012, yields fell to 117k bushels, valued at \$1.1M, a loss of \$3.0M. Together, the value of water to the crop in the 2012 crop year can be estimated at over \$10M. Also, it is important to note that irrigated farmers that have planted high density stands (assuming irrigation) have little room for adjustment should water allocations run short in any particular year, as the high plant population will be demanding additional water. Finally, as climate change further contributes to ever widening temperature and precipitation extremes, it is clear that management of water resources becomes significantly more important.

3) Environmental Benefits - By reducing the amount of water diverted, additional water flows can be allocated to augmenting downstream flows to the Platte River, home to several endangered species such as the Pallid Sturgeon and Piping Plover. In addition, from the MLPPID Irrigation District perspective, there are several environmental benefits: first, the district currently treats with algacide to

control aquatic weeds--if canal spills are reduced or eliminated, there is less chemical discharge to the River. Also, District ditch riders can drive up to 250 miles per day manually adjusting water control gates--automated gates would allow them to monitor and control the canal without driving to each gate. Finally, since all the irrigation gates are solar-powered, they will have zero impact on electrical consumption and related greenhouse gases.

4) District Benefits - MLPPID will directly benefit through improved efficiencies and management of diverted water. Since each automated gate will work in concert with upstream / downstream gates, there will be less "canal bounce" and more efficient delivery to the District's customers. Finally, since the gates have the ability to adjust on a real-time basis, ditch riders will no longer be required to adjust water flows by turning wheels or pulling boards in the middle of a storm. This reduces OH&S risk and frees up the time that would normally be spent driving to site and creates fuel cost savings for the District.

Ultimately, 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 expected to be 30 years. Middle Loup's main interest with this project is to be sustainable with the basin's water supply going forward. 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.

- 3.A 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 estimated at \$2.95M. 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% of the up-front capital costs per year. These ongoing maintenance and data costs are largely offset by reduced vehicular and operations costs. The estimated construction period is 36 months commencing November 2021, and the estimated economic life of the installed equipment is 30 years.
- 3.B 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 intangible or secondary benefits (if any) 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, in a way that justifies economic feasibility of the project such that the finding can be approved by the Director and the Commission (005.02). The primary tangible benefit resulting

from this project will be management of the water delivery in Canal 3 and Canal 4 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 expected to be at least 30 years.

- 3.C Present all cost and benefit data in a table to indicate the annual cash flow for the life of the project (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. Full Project benefits will accrue equally over the 30-year economic life of the project once completed.
- 3.D 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, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.) This project will increase water sustainability by allowing control of water flows more precisely than previous methods and will provide new data for quantifying water usage, operational spills, recharge rates and system efficiencies. 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.

Prove Financial Feasibility

(Applicant must demonstrate compliance with Title 261, CH 2 - 006)

4. Provide evidence that sufficient funds are available to complete the proposal. Middle Loup Irrigation District has been awarded \$2.7M as a result of ice flow damage that occurred in the winter of 2019. In order to secure this funding, the District was required to contribute 25% of the \$2.7M (\$675,000) which has already been accomplishing through a revenue bond sale, which will be paid back by MLPPID customers. Subsequently, the Board of Directors of MLPPID has unanimously agreed to apply \$2.0M of these funds towards canal automation. In addition, the Lower Loup Natural Resources District has agreed to support the canal automation with a contribution of \$100,000 for the project. In addition, the Middle Loup Public Power and Irrigation District has a contract with farmers to supply water which is charged to users. It is important to note that each automated gate will contribute to water efficiency gains--while the planned

and budgeted complete build-out provides maximum water savings and operational benefits, the system does NOT require a complete implementation to yield results.

5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace). See Appendix 4.
6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal. As indicated above, in order to secure the FEMA funding, the District has already secured \$675,000 (\$500,000 applied to canal automation) in additional funding (and the money is already available) through bond sales which will be paid back by the customers of MLPPID.
7. Describe how the plan of development minimizes impacts on the natural environment (i.e. timing vs nesting/migration, etc.). 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 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 staff of MLPPID routinely does civil (structural concrete) works every year and understands and sees value to the District in making these improvements. Finally, 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:

- 10.A Provide a complete listing of all lands involved in the project. n/a
- 10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held. n/a
- 10.C 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 consequences (environmental and ecological) that may result if the project is or is not completed. 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 above. 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 optimize water use efficiency by allowing flows to remain in the Middle Loup River/Sherman Feeder Canal, which ultimately flow into the Platte River

that provides water for the Cities of Lincoln and Omaha downstream. According to the City of Lincoln, "Lincoln's water source is groundwater that is naturally high in quality. It comes from wells along the Platte River near Ashland. Approximately one-half of the supply is groundwater and approximately one-half is groundwater UNDER THE DIRECT INFLUENCE OF SURFACE WATER" (Capitalization added for emphasis- Source: <https://app.lincoln.ne.gov/city/ltu/water/quality.htm>). Continuing, "In 2020, more than 12.5 billion gallons of water were pumped from these wells to serve the 292,000 people who used an average of about 34.2 million gallons of water each day." For the City of Omaha (serving 220,000 customers), the water supply includes the Missouri and Platte Rivers and the Dakota sandstone aquifer. Again, conservation efforts in the Loup Basin ultimately improve flows in the Platte, better securing drinking water supplies for those municipalities and surrounding industrial facilities downstream. And, as mentioned earlier, by minimizing spill from MLPPID's canal, it will allow the aquatic herbicide to remain in the canal, where it is needed -- and not diverted back into the river preserving water quality.

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 along Canal 3 and at key structures on Canal 4. The inflow information at the 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 utilizing 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 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 Middle Loup River / 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/Middle Loup River 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 groundwater 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 \$2.95M, of which ~\$850k is requested in this grant submission, as the balance has already been secured. The outcome of the project will be the minimization of spills and drastically improved water efficiency. As mentioned earlier, the USBR estimates that (on average) 18% of water diverted into a canal is lost through seepage and unintended operational spill. By diverting only water that is needed by MLPPID customers, that water can be retained in the canal, Sherman Reservoir or ultimately downstream in the Platte River for other beneficial uses. The O&M costs over the 30-year asset life of this solution are estimated at less than 2% of the capital expenditure. O&M costs are expected to be 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 35,000 gates and meters in 15 countries and offers Nebraska-based technicians and resources. The integrated solution is tested and supported by a well-established Company. It is expected 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 Nebraska (Frenchman-Cambridge Irrigation District), California (Oakdale Irrigation District, Turlock Irrigation District, Solano Irrigation District), Washington (Naches Selah Irrigation District), Arizona (PIMA Maricopa Irrigation District), and other Western States. (See Appendix 6 for more detail) 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 and Piping Plover 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 selected locations on 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. In addition, additional harm to lands that experience flooding may be incurred including 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 District has already secured \$2.1M in funding to support the Canal Automation project. This funding has come through FEMA and through long-term bonds by MLPPID Board action. In addition, the Lower Loup Natural Resources District (LLNRD) has committed an additional \$100,000 in support. MLPPID is committed to securing the additional funds to secure completion of the project. This application is testimony to their commitment.

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.

Over the past few years, the Middle Loup Public Power and Irrigation District has worked on improving system efficiency to conserve and sustain a water supply for downstream users. Conversion of 74 miles of open lateral systems to pipeline has been completed and represents a previous investment by the District over more than \$2,122,000. As installing pipeline is generally only cost effective on smaller canals and laterals, automated canal gates are the best economical choice on larger (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, with 2012 being a prime example. The improvement of quality and quantity issues will help Nebraska 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 thousands, 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.

Estimated Costs & Sources of Funding - Canal Automation MLPPID

Estimated Costs

MLPPID Canal 3 / Key Gates at beginning of Canal 4	\$2,950,837
--	-------------

Estimated Sources of Funding for Canal Automation

		Source of Funding Confirmed?
FEMA funding (from Ice Flow Damage)	\$ 1,500,000	YES
MLPPID Funding (bond sales - 25% of FEMA money [required])	\$ 500,000	YES
LLNRD funding	\$ 100,000	YES
Total Funding	\$2,100,000	

Additional Funding Needed (Estimated Costs minus Estimated Sources of Funding)	\$ 850,837
--	-------------------

This project can and will be implemented in phases--with each phase adding to the water efficiency--so a complete "build out" is not absolutely required to yield significant benefits from the project.

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 watersheds to be affected are 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 the demand. Operational spills will be reduced, leaving more water in the river and will be 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, it is exposed to a multitude of contaminants such as animal feces, aquatic pesticides, 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.

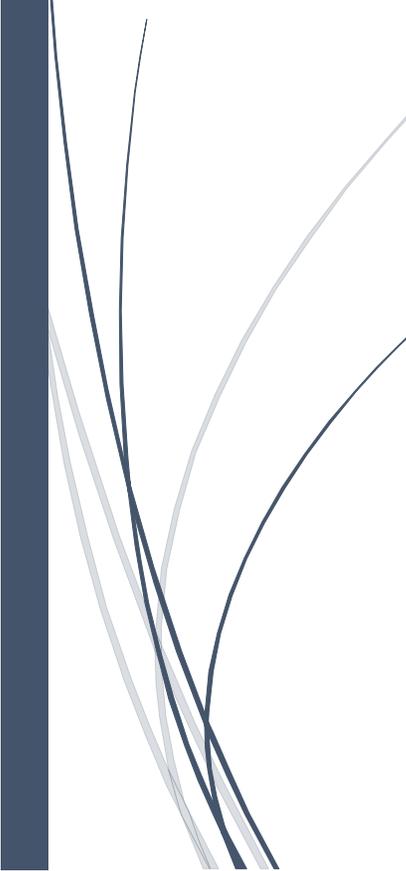
16. Federal Mandate Bonus. If you believe that your project is designed to meet the requirements of a federal mandate which furthers the goals of the WSF, then:

- 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 and Piping Plover bird are endangered species in the Lower Platte. The federal mandate is to protect those species from extinction. The water saved by this project will assist in the protection of these species. Finally, the project supports the Clean Water Act and the Safe Drinking Water Act (also federal mandates); the water saved will assist with those goals.



Appendices (Attached separately)

- 1) **Established Financial Partnership Documentation**, Section A, Part 4 & Section C, Part 13
 - a) Federal Emergency Management Agency (FEMA) Funding Letter
 - b) Lower Loup NRD
 - 2) **Engineering & Technical Feasibility**, Section B, Part 1.A.1
 - a) Long Funding Synopsis sent to FEMA, 13 Feb 2020
 - b) Short Funding Synopsis sent to FEMA, 25 Feb 2020
 - 3) **Economic Feasibility**, Section B, Part 3
 - a) Cost and Benefit Data - Water Conservation Calculation
 - 4) **Financial Feasibility**, Section B, Part 4
 - a) Board Financial Commitment, Meeting Minutes, June 7, 2021
 - 5) **Letters of Project Support**
 - a) MLPPID Board President
 - b) Lower Loup NRD (attached also in Appendix 1)
 - c) Loup Basin Surface Water Development Association
 - d) Loup Basin Reclamation District
 - 6) **Canal Automation Case Studies - Success Stories**
 - a) Frenchman-Cambridge Irrigation District, Nebraska
 - b) Oakdale Irrigation District, California
 - c) Naches-Selah Irrigation District, Washington
- 

Middle Loup Public Power and Irrigation District
Gerry Sheets, Manager
140 S. Fonner Street, Arcadia, NE 68815
308-789-6401