NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Stream Flow Enhancement and Retiming

PRIMARY CONTACT INFORMATION

Entity Name: Farwell Irrigation District

Contact Name: Matt Lukasiewicz

Address: 501 South Rd., Farwell, NE 68838

Phone: 308-336-3341

Email: mluk@qwestoffice.net

Partners / Co-sponsors, if any: Click here to enter text.

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

   Grant amount requested. $ 3,308,436

   Loan amount requested. $ Click here to enter text.

   If Loan, how many years repayment period? Click here to enter text.

   If Loan, supply a complete year-by-year repayment schedule.
   Click here to enter text.

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) Click here to enter text.	N/A☐	Obtained: YES☐	NO☐

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. Click here to enter text.

If yes what is the population served by your project? Click here to enter text.

If yes provide a demonstration of need. Click here to enter text.

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? Yes, the scope of the project has been reduced and all responses have been updated.

If yes, describe the changes that have been made since the last application. The idea and technology is the same as a previously submitted application but the size of the project is smaller, the dollar amount is smaller, the project involves one Irrigation District instead of 3, and focuses on only one canal system in that District. All answers have been rewritten.

No, I certify the application is a true and exact copy of the previously submitted and scored application. (Signature required) Click here to enter text.

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? $ Click here to enter text.

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. Click here to enter text.

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. $0

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);
Phase one of the three phase approach will require the installation of gates, telemetry, and software along the Main Canal system of the Farwell Irrigation District. According to the Rubicon Water Scoping Study, that was developed by their Practicing Engineers, a detailed analysis of the project was provided, to review the project in its entirety.

A description of all field investigations made to substantiate the feasibility report (004.01 B); A copy of all structures as originally built were provided to Rubicon's Engineers, and a site visit was performed to verify the structures 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. The specific configuration of gate model and quantity is subject to change pending field verification for the sizing data gathered during the scoping phase of this project.

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); Refer to, figures 4, and 15-17, in the attachment titled "FID Maps and Diagrams."

A description of any necessary water and land rights and pertinent water supply and water quality information, if appropriate (004.01 D);
The Farwell Irrigation District has a water right of 229,323.5 acre feet and a storage right of 68,120 acre feet.

A discussion of each component of the final plan including, when applicable (004.01 E); This project, known as phase one, will be the operation of Rubicon's gates and automation throughout the Main and Lower Main Canals, followed by the final plan at a later date. At that time, the full implementation of a three phase approach for total channel control of the three main canal systems within the Farwell Irrigation District along the Middle Loup River can be addressed. You may also refer to a detailed description of the equipment being used in all three phases, in the attachment titled "Total Costs."

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. The beneficial outcomes of this project are a result of eliminating historical unmanaged operational spills from the Main and Lower Main Canals. Real-time logged historical spill data is not available to provide a precise value of these historical unmanaged canal spills. It is common for reliable pre-modernized spill information to not be available, as this data requires precise in-field instrumentation connected to real-time data logging or telemetry to undertake these measurements. However Rubicon Water has implemented more than fifteen Total Channel Control projects globally including in Oakdale, Turlock and Solano Irrigation Districts in California and Naches Selah Irrigation District in Washington, and the spill reduction outcomes from these projects provide a good baseline for reasonable estimate of the volume of water that will be recovered by this project. Typical system spill figures observed in pre-modernized operations in previous Total Channel Control projects have ranged from 10-20%. It is common in Rubicon's experience to base savings opportunities on the experience of savings made in a large number of previous project implementations. If the Main Canal losses are typical of the broad range of canals that Rubicon has experience with, then the annual operation spill volumes would be in the order of 5,725 acre feet to 11,450 acre feet. If we are to be conservative and assume the Main Canal has operated on the low end of this range, then 5,725 acre-feet would be reasonable spill estimate to use and provides a reasonable estimate for the volume of water that will be made available by this project.

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 improve operational efficiencies and increase stream flow by minimizing diversions. 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. Where new structures are proposed, these will be designed and constructed in accordance with existing approved plans to match existing check structures with consideration given to local geology and footing construction requirements

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 next best alternative to economically conserve water is to bury open laterals within the canal system into PVC pipe, which can cost up to ten times more than the proposed method on the larger canal sizes encompassed in this project, As much as 220 miles of laterals have already been buried into PVC pipe where able, up to 27". If larger pipe is used, then it is not economically feasible. By better managing the flow in the larger canals, with this project, any excess water can be conserved, as well as eliminating additional exposure to other contamination. Additionally, the basin benefits from the recharge via these larger canal systems and by putting those into pipe or lining would eliminate a major contributor to ground water recharge. Therefore, there is no known 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 have already been complete and a final analysis will take place once the project receives funding, to ensure the exact projections. The total cost for this project is estimated at $5,514,060. All of the selected hardware is priced by Rubicon's standard product offerings. The engineering performed by Rubicon Water looked at the sizing of the gates to be installed, based on the physical dimensions of the existing

structures and the required flow capacities in each pool. Once the project is operational, annual operational costs will be limited to software support and maintenance at $10,100, along with routine maintenance of the hardware which typically comes in at less than 1.5% of the up-front capital costs on these larger projects. Anything else will be done in-house, as part of daily activities of the Irrigation Districts. The projected construction period is estimated to be 2 years. The durable marine-grade aluminum and stainless steel construction and the most up to date software technology is expected to last far into the future. The gates are manufactured with a 30 year design life and the annual operation and maintenance costs of these gates installed in equivalent irrigation districts is approximately 1.5% of the up-front capital costs.

- 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 of this project will be the prevention of more than 5,725 acre-feet of unmanaged spill from Sherman Reservoir each year, providing the opportunity to make this water available for beneficial use for downstream users at their time of need later in the season such as when the river experiences peak demand in August. This water will be recovered and retained in Sherman Reservoir to be retimed for late season releases which will benefit a range of downstream interests. The benefits of this recovered water will accrue over the full economic life of the project – which is expected to be 30 years. The total project capital cost is $5,514,060. Given the 30 year asset life, the capital cost of water recovered will be $32 per acre-foot per year– which makes the economics of the project very attractive. Another tangible benefit is the increased rate of recharge along the length of the Main and Lower Main canals and within Sherman Reservoir, which will increase groundwater availability to users throughout the surrounding counties. By increasing the stream flow in the Middle Loup River, the project will also contribute to domestic uses downstream as far as the Missouri River, recreational opportunity, more habitat for endangered species, all during the summer months when the demand is at its peak. Furthermore, irrigation pumps along the River, with a higher stream depletion factor, will capitalize on the additional water.
- 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). This project will not generate revenue. The Farwell

Irrigation District is a non-profit organization, looking for ways to improve water conservation and general operation efficiencies. This approach maximizes the benefit-to-cost ratio that can be achieved to ensure that maximum water savings are realized early in the modernization program. The total cost of the project is broken down into three phases, in an attachment "Total Costs." Also, a simplified table showing the long range expenses is in an attachment "WSF Cost Analysis."

- 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). Management of basin sustainability means managing the availability of water to meet the needs of users. The precise management of the volume and timing of supply releases improves basin sustainability by ensuring that water is available at the time of need of downstream users and that water does not pass through the system without benefit. This project solution known as Total Channel Control (TCC) is a management tool to enable the precise control of the volume and timing of flows to eliminate the loss and waste of stored and diverted water. This management tool enhances water sustainability in river basins by providing multiple benefits: A. Enhanced groundwater recharge in wet years – the water tight gates can be used to run the Main Canal and Lower Main Canal deeper for longer and therefore provide targeted incidental recharge, adding water availability to the system before the commencement of surface water deliveries. B. Reduced excess extractions from river, groundwater and surface reservoir storage in dry years – increased surface water availability reduces the need for groundwater pumping – thereby reducing aquifer depletion. C. Improvements in water quality for downstream users and accompanying improvements in river health – water quality and river health improvements are achieved by minimizing the spill of irrigation water back into the river. These benefits provide positive impacts to all users in the river basin.

4. Provide evidence that sufficient funds are available to complete the proposal. The Farwell Irrigation District is considered local Government with taxing authority, on a per acre basis, and have the ability to increase those rates annually for budget purposes. Also, in regards to larger project, the District has Bonding authority. Furthermore, you may refer to the District financial statements, provided as an attachment titled "2016 Budget." In the event that additional grants are not awarded and bonding is necessary, in the annual budget are items designated for Project Improvement and Project Improvement Reserve, which can be used as payment towards those bonds.

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

As previously stated 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.

By utilizing the existing infrastructure, there will be no new development that will affect 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 and which provides a zero energy zero emission alternative to groundwater pumping; The solution provides wildlife benefits to sustain the environment by increasing instream flows at times of critical need; 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.

By having an existing water right, existing facilities to work with, and annual budgets that has taxing authority and bonding authority, makes this project capable for implementation. Under our water right, the Nebraska Department of Natural Resources follows our operations to ensure we are within our legal right. Additionally, we operate locally since the 2002 title transfer, and no longer need to go through the Federal Government.

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

Similar projects have been proven through case studies to decrease operational loss of diverted water, and provide the opportunity to leave water in the River and increase the availability of storage water to allow retimed additional flow as needed. The beneficiaries of the additional stream flow are each and every person and political subdivision who depends on that supply for their needs, geographically from the Middle Loup River in Custer County to where the Platte River meets the Missouri River.

10. Are land rights necessary to complete your project?

YES☐ NO☐

If yes, provide a complete listing of all lands involved in the project.
Click here to enter text.

If yes, attach proof of ownership for each easements, rights-of-way and fee title currently held.
Click here to enter text.

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

11. Identify how you possess all necessary authority to undertake or participate in the project. The Farwell Irrigation District is recognized a Local Governments, that is governed by a Board of Directors that oversee the best interests of the District and their water users. Also 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.

Improved water quality for downstream users and accompanying improvements in river health - water quality and river health improvements are achieved by minimizing 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 others. Furthermore, the increased stream flow from un-diverted water for the Irrigation District and the retiming of additional groundwater recharge, contributes to more uncontaminated water in the Middle Loup River that helps dilute the stream. The improved quality and quantity of the Middle Loup River will be shared by any municipality, domestic, or agricultural user from the upper stretches of the River to the Nebraska and Iowa boarder. Two major appropriators along the River is the City of Lincoln and the City of Omaha, who rely on that supply for their citizens. On any given year, Nebraska could experience a drought similar to what occurred in 2012. Looking back on a dry 2012 year, that water could have been very useful for a major part of the State, if this project was already in place. If quality and quantity issues can't be improved now, thing may only be worse the next time.

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 has an adopted "Voluntary IMP" that includes goals and objectives to address water quality and quantity issues by utilizing existing authorities. This project has been introduced to the Lower Loup NRD and accepted by their Board as a way to improve these quality and quantity issues. "Goal #2" in the IMP, looks to implement this plan to maintain an efficient and economical balance between current and future water supplies and demands. This type of Total Chanel Control project has been implemented in similar Irrigation Districts in California such as Oakdale, Turlock and Solano Irrigation Districts and in Washington in Naches Selah Irrigation District and has seen the elimination of operational spill from the canal networks, which provides an opportunity for annual water savings to the Middle Loup River. The expected spill savings of more than 5,725 ac-ft every year will be created over the thirty year asset life of the project, improving the cost to benefit ratio every year of the solution's existence. In addition, the enhanced recharge opportunity provided by a deeper Sherman Reservoir and fully charged canals prior to the commencement of surface water deliveries at the start of the irrigation season will enhance groundwater recharge to the benefit of groundwater users. This type of project could be incorporated into the IMP during future annual reviews as an effort to avoid being Fully Appropriated. Prior to this proposal, the Farwell Irrigation District has been contributing to conservation by burying as much as 220 miles of open laterals in our canal system, identifying areas of the canal to be lined where major losses occur, and implementing automation. These practices have been on-going for more than 50 years and have proven to reduce the amount of water needed by 30% for the Irrigation District. While the District continues to find ways

to conserve water, other factors work against us such as unrestricted ground water pumping along the Middle Loup River in areas that have a high stream depletion factor.

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.

Managing river basin sustainability requires intervening in those factors which can be controlled to ensure that water availability exceeds water consumption. Storage provides a control mechanism to increase water availability in dry years. Solutions which maximize the availability of stored water provide enhanced management tools to improve basin sustainability. The availability of stored water is maximized by managing the volume and timing of releases to match the needs of users. The precise management of the volume and timing of supply releases improves basin sustainability by ensuring that water is available to instream flows and downstream users at their time of need, and does not pass through the system without benefit. This project provides a management tool to enhance water sustainability by providing the following benefits:

1. Enhanced groundwater recharge at the start of the season and in wet years – Total Channel Control's water-tight gates can be used to run specific sections of canals deeper for longer and therefore provide targeted recharge, adding water availability to the system. This enables enhanced recharge in the canal network before the start of the irrigation season by maintaining a constant head of water in each pool along the length of the irrigation canal, maximizing the amount of recharge both before and after the commencement of the irrigation season.
2. Reduced excess extractions from river, groundwater and surface reservoir storage in dry years - Increased stored water availability reduces the need for river diversions and groundwater pumping – thereby increasing instream flows and reducing aquifer depletion. Increased recharge resulting from pre-season canal filling and operations will increase the amount of stored groundwater and elimination of operational spill during the irrigation season will increase the volume of stored surface water which will be available at time of critical need for downstream users.
3. River flows are increased along the reaches parallel to irrigation districts, with associated environmental benefits.

These benefits of enhanced groundwater recharge, increased surface water availability and increased instream flows provide positive impacts to all users in the river basin. Total Channel Control is an effective basin management tool that allows precise management of stored water and in so doing greatly improves sustainability of the river basin. The Farwell Irrigation District is located in Sherman and Howard Counties along the Middle Loup River, with a river diversion that expands into Northeast Custer County.

Once implemented, this project could be used to improve ground water recharge by maintaining a higher level in Sherman Reservoir for a longer period of time, with the option to operate a higher and more consistent level in all canal systems at the start of the irrigation season to enhance recharge through the length of the canal network. This recharge will help benefit ground water users and help with stream flows by retiming that additional recharge back to the Middle Loup River. These canal and reservoir levels can be achieved, because with Total Chanel Control, the canal system will be automated 24/7 to reduce the operational spills that are currently occurring in the canal system. "Spill" is the unmanaged excess release of water from an irrigation network with potentially decreased quality and availability to meet the time of need of downstream users and instream flows. The recovery of those spills increases the storage availability in the reservoir, which ultimately decreases the amount of water needed to fill the reservoir or makes more water available for beneficial use later in the season. The recharge and retiming of this water will benefit fish and wildlife along the Middle Loup River, any appropriator along the River, can be used for recreational purposes, used for municipal supplies, hydro power, and any ground water pumping along the River from Custer County to where the Platte River meets the Missouri River at Iowa. These benefits of enhanced groundwater recharge, increased instream flows and improved water quality provide positive impacts to all users in and around the river basin, including the streams below. Total Channel Control is an effective basin management tool that allows precise management of stored water and in doing so greatly improves sustainability of Nebraska's water supply.

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 contributes to multiple water supply goals by providing enhanced management tools to match supply to demand to better manage stored water, provide enhanced recharge opportunities, and improve basin sustainability. The availability of stored water is maximized by managing the volume and timing of releases to match the needs of users, and also by enhancing ground water recharge early in the season. The precise management of the volume and timing of supply releases improves basin sustainability by ensuring that water is available to instream flows and downstream users at their time of need, and does not pass through the system without benefit. This system makes more water available at times to meet the needs of downstream users and instream flows. 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 make more surface water available longer through the growing season and thereby extend water availability and resultant crop yields. For those farmers who rely solely on surface water, the additional water availability will increase crop yields. For farmers who use a mix of surface water and ground water, additional surface water will reduce pumping of groundwater and resultant aquifer overdraft and greenhouse gas emissions. Note that for those farmers who presently pump from surface water supplies the required lift is significantly less than the lift from deep aquifers and so the energy input requirements of pumping surface water are much lower than pumping ground water – with resultant decrease of load on the supply grid and carbon emissions. In dry years, the additional water made available with this solution can mean the difference between a successful crop and a failed crop. 3.Municipal and Industrial Uses - Increased stored surface water availability reduces the need for river diversions and groundwater pumping – thereby increasing instream flows and reducing aquifer depletion. The retiming of release of surface storage water changes the time of availability of this water for downstream users and makes it available at times of scarcity later in the year around August. At present, operational spills pass downstream at times where they may not be required by downstream users due to abundant instream flows. The ability to control the release of this recovered water allows this water to be passed downstream later in the season when instream flows are lower than required. 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 the 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. Wildlife habitat will benefit from an ability to retime release flows to buffer low flow situations that can occur late in the year. 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 surface storages makes more water available to the river system in times of water scarcity – thereby conserving water resources. The ability to enhance recharge along the length of the Main and Lower Main Canal will also conserve aquifer volume and groundwater availability in the region. 7. Preservation of Water Resources - The ability to manage the time of release of stored water 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. These benefits of enhanced groundwater recharge, increased instream flows and improved water quality provide positive impacts to all users in the river basin. A report on the water savings was developed by Rubicon Engineers for the Irrigation District, and is provided in an attachment titled “Projected Savings.” This saved water will be in addition to the water already in the Middle Loup River every year, plus the additional retiming from the recharge of the canals and reservoir.

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 making more surface water available at time of need, by enhancing aquifer recharge, and by managed increases in instream flows times to be available during times where these have been historically lower than required.
The project will not result in any decrease or reduction in beneficial uses.
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.
By making more stored surface water available for beneficial use at its maximum time of need, this project can protect crops from water shortage, and can maintain stream flows during times of water shortage.
By enhancing groundwater recharge in times of water surplus, the system can increase the availability of groundwater for the benefit of groundwater users. Automated operation of water tight gates during the early stages of river flows will allow the irrigation canals to be operated at their maximal recharge capability earlier in the season to extend and improve the recharge opportunity. The canals can be run deeper for longer and therefore provide targeted recharge, adding water availability to the system.
After Sherman Reservoir is filled, the availability of this stored water is maximized by managing the volume and timing of releases to match the needs of users. The precise management of the volume and timing of supply releases improves surface water availability by ensuring that water is available to instream flows and downstream users at their time of need, and does not pass through the system without benefit earlier in the season. This has the additional benefit of increasing instream flows and reducing aquifer depletion.
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 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.
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.
The project outcomes will also leverage state dollars by creating the opportunity for increased taxation revenue accruing from increased agricultural crop yields. As an example, the 5,725 acre feet of water made available as a result of this project would allow 5,725 extra acres to be irrigated with that water at a rate of 12 inches per acre. If corn yield is 200 bushels per acre at $3.00 a bushel then the return to the economy would be $600 per acre foot of water multiplied by 5,725 ac-ft which equals $3,435,000 per year of additional taxable revenue. Over the 30 year asset life of this project this would amount to an increased revenue base of $103 Million.
This project is capable of impacting a large portion of the State and its water supply far into the future. By creating additional stream flow and retiming from additional recharge, there is potential for more recreational opportunities, more ground water recharge for all pumping uses, a more consistent domestic supply, additional irrigation and agricultural opportunity, increasing habitat for all species along the stream, and also improving the State's economy.
A full implementation of this project will benefit all of the users who depend on this water, and will affect an area of the State, staring in northeast Custer County, all the way through Lincoln and Omaha to the Missouri River. This impacts heavily populated communities and all opportunities along the Middle Loup River, the Loup River, and part of the Platte River, which cuts through a large portion of Nebraska.

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 $5,514,060. The outcome will be the ability to capture and retime more than 5,725 acre-feet of water each year which presents a significant annual water savings opportunity for the Middle Loup River, Loup River, and part of the Platte River once fully operational. The O&M costs over the 30 year asset life of this solution are estimated to be less than 1.5% of the capex – or less than $83,000 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 benefits that will be realized are more than 5,725 acre-feet of water made available each year at the time of need of downstream users and additional groundwater availability resulting from significantly enhanced recharge in Sherman Reservoir and along the length of the Main

and Lower Main Canals. When the capital costs of the project are amortized over the 30 year asset life, the water made available from recovered spills is at a cost of only $32 per acre-foot per year – the value of this water is significantly greater than the cost of making it available. This $32 per acre-foot does not consider the additional water that will be made available through enhanced aquifer recharge – which will create further economic value in this project. This cost is presented in present-day dollars, the long-term nature of this investment means that the economics are even more compelling when future fluctuations in financing costs are considered. Experience shows that the adopted Total Channel Control automation solution typically costs 1/10 of the price of converting larger canals to pipeline, and is significantly cheaper than constructing balancing storages. The District has previously buried open laterals within the canal system. As much as 220 miles of laterals have already been buried into PVC pipe where able, up to 27". If larger pipe is used, then we know from experience that piping is not economically feasible. Automation of the existing check structures is economically attractive because it is adding to existing infrastructure investments and leveraging these previous investments. The costs of the project are a combination of control gates and telemetry hardware, civil works to modify existing structures, and labor associated with configuring the control system. These costs are documented in the accompanying Rubicon Scoping Study on page 84 of the document. Anything not covered under the costs presented in the Scoping Study will be done in-house, as part of daily activities of the Irrigation Districts. This project is designed to be implemented over a two-year timeframe. The project benefits will accrue after the first year of implementation and after the completion in the second year the full project benefits will accrue equally over the 30 year economic life of the project. 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 improve. The construction costs to build a project will also consistently improve. 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 Middle Loup, Loup, and Platte Rivers have a tremendous number of users in and along their system. These users have appropriations with priority dates attached, subordination agreements, and in-stream flow permits, that on any given year can be affected due to drought-like conditions. In drought years, calls can be made on appropriators, payments made mandatory through agreements, and harm can be expected to federally-protected endangered species if stream flows are depleted. Retiming of flows will help meet any obligation, and make more water available late season to suit downstream critical need.

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 Untied 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 manage the operation of the Main and Lower Main canals 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 would be safely passed downstream through the system. By managing the water supply 24/7 throughout the Farwell Irrigation District, the millions of dollars invested in the construction of the system can be better protected, and the 53,414 acres the District supplies will continue to be served should extreme events such as rain, lightning 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 for thousands of acres 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.

Water quality and river health improvements are achieved by minimizing 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. Eliminating spill from the end of the canal network prevents these contaminants from being introduced to the river.
The increased instream flow that results from the retiming of water diversions and the enhanced groundwater recharge enabled by this project contributes to more fresh water in the Middle Loup River that helps dilute the stream of existing pollution. 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.

This Project is seeking Federal Grants as well. Earlier this year, the NRCS announced Funding for “Conservation Innovation Grants” to which an application was submitted in the amount of $2,000,000. Last year the Lower Loup NRD approved supporting this project when it involved multiple Irrigation District’s. Since this application has been down-sized to one District, an official proposal has not yet been re-introduced to them. However, this project has been introduced to MUD (Omaha), the City of Lincoln, and LPNNRD and the LPSNRD. At this time, all have expressed positive comment about the proposal and are interested but request additional specifics on the amount of water that would be beneficial to them. By receiving funding for this first phase, real results can be provided to these entities once completed and support can be gathered across the State of Nebraska for the full three phase implementation.

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 Farwell Irrigation District has invested millions of dollars in infrastructure to conserve as much of their water supply as possible. Prior to this proposal, the Irrigation District has been contributing to conservation by burying as much as 220 miles of open laterals in their canal system, identifying areas of the canal to be lined where major seepage occurs, and implementing automation. These practices have been on-going for more than 35 years and have proven to reduce the amount of water needed by 30% on average for the Irrigation District. While the District continues to find ways to conserve water, other factors work against them such as unrestricted ground water pumping along the Middle Loup River in areas that have a high stream depletion factor. This is one of many reasons why the District must continue identifying ways to stretch our water supply. Analyzing what has been done and what can be done moving forward, technology and automation is that next step to conservation. This project has been proven in other Irrigation Districts and can have the same results in Nebraska if funded. Managing river basin sustainability requires intervening in those factors which can be controlled to ensure that water availability exceeds water consumption. Water is available from two sources – precipitation and storage. The timing of precipitation and resultant snow melt and river runs cannot be controlled - and so cannot be managed. By contrast, the volume and timing of storage releases can be managed to improve water availability in a river basin. Storage is often required to maintain water availability in dry years. Basin sustainability is improved by maximizing the availability of stored water. Stored water is available to be managed up until its time of release. At that point it is either beneficially consumed, or it passes through the system without benefit. The availability of stored water is maximized by managing the volume and timing of release to match the needs of users and eliminate the loss or waste of stored water. By increasing efficiencies within our Irrigation Districts, the timing of storage releases can be better managed to make more water available in the River at times of shortage late in the season, and increase a sustainable 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.

Any time there is a drought in our State, it is a major issue that can be detrimental to all. On any given year, Nebraska could experience a drought similar to what occurred in 2012. Looking back on a dry 2012 year, the water saving that are being proposed in this application, could have been very useful for a major part of Nebraska, if this project was already in place. If quality and quantity issues can't be improved now, thing may only be worse the next time. Because the Middle Loup, Loup, and Lower Platte Rivers impact such a large part of the State, this project could be extremely beneficial for hundreds, if not millions of domestic and agricultural users in Nebraska. The intent of the Water Sustainability Grant is to implement ways to improve and sustain our States water supplies. This project has been proven to do just that in number of case studies, and will continue to eliminate those issues far into the future by increasing the amount of stored water available to supplement River flows. Please refer to an attachment titled "Case Studies." Additionally, a meeting was held with several Department of Natural Resources employees to discuss and understand the administration and feasibility of this project. The conclusion was that positive results will be realized by this project.

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.

This project is seeking Federal Grants as well, from the NRCS for "Conservation Innovation Grants" to which an application was submitted in the amount of $2,000,000. At this time the project has been introduced to MUD (Omaha), the City of Lincoln, and LPNNRD and the LPSNRD. While all are interested in the project, they are awaiting realized results. At that point, funding requests can be negotiated. By receiving funding for this first phase, real results can be provided to these entities once completed and support can be gathered across the State of Nebraska for the full three phase implementation. Without funding from these entities or the NRCS, the option would go back to the Farwell Irrigation District Board of Directors to consider raising the District rates on a per acre basis or Bond for the amount needed. The project outcomes will leverage state dollars by creating the opportunity for increased taxation revenue accruing from increased agricultural crop yields. As an example, the 5,725 acre feet of water made available as a result of this project would allow 5,725 extra acres to be

irrigated with that water at a rate of 12 inches per acre. If corn yield is 200 bushels per acre at $3.00 a bushel then the return to the economy would be $600 per acre foot of water multiplied by 5,725ac-ft which equals $3,435,000 per year of additional taxable revenue. Over the 30 year asset life of this project this would amount to an increased revenue base of $103 Million.

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 where the Loup River flow into. The key performance outcome of this proposal will be the elimination of uncontrolled spills from the main canals and laterals of the Farwell Irrigation District during normal operation. By precisely matching supply with demand, operational spills will be eliminated, leaving more water in the river and retained in storage 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 minimizing unmanaged withdrawals from the reservoir through automation, water saved is water available to the farmers later in the growing season, and reducing the outflows for irrigation will help to maintain the reservoir above the critical call level. When assessing the concept of eliminating unmanaged spill, the assumption can sometimes be made that return flows are available to downstream users, and so eliminating spill must therefore reduce water availability to downstream users. This position does not consider timing, specifically whether the return flows are timed to meet the needs of downstream users. By eliminating unmanaged spill the water is held available in storage 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 - water quality and river health improvements are achieved by minimizing 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. In addition, river flows are increased along the reaches parallel to irrigation districts, with associated environmental benefits.

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 Farwell Irrigation District monitors on a daily basis the river diversions from the Middle Loup River. It monitors through measuring devices the canal and lateral diversions and monitors through meters 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. 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 only 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.

In summary, this project will enhance water sustainability in the Middle Loup Basin by recovering more than 5,725 acre-feet of unmanaged spill from Farwell's Main and Lower Main Canals each year and retaining this water in Sherman Reservoir. This will allow retimed releases to provide increased stream flows at times of peak need, enhanced groundwater recharge, sustained crop production, preservation of wildlife habitat, and improved health of the Middle Loup River. Precise control of flows through the Main and Lower Main Canals will allow enhanced groundwater recharge in wet years, flood control, reduced excess river extractions with resultant increased instream flows and river health, enhanced recreational opportunities, and enhanced aquifer and surface reservoir water availability in dry years. Precise flow measurement and control gates will be installed on the Main and Lower Main Canals and a control system will continuously manage flows through these canals to exactly match the needs of users, thereby eliminating unmanaged operational spill and creating water savings for further beneficial use. The technology employed by the Irrigation district described above provides a key opportunity to economically recover water in the primary canals and laterals of their irrigation system. Water savings can be achieved by addressing the loss components that are generally present in open canal and cast in place gravity pipe systems.

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 network and control system. This project is expected to take two years to complete. The first year will include a detailed inspection and analysis of the Irrigation District's Main and Lower Main Canal system to confirm system specifications and the preparation of concrete check structures and installation of control gates, communications, hardware, software, and training. Year 2 will continue implementing any uninstalled components to complete the system implementation.

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.

This project is seeking Federal Grants as well, from the NRCS for "Conservation Innovation Grants" to which an application was submitted in the amount of $2,000,000. Those results will be announced later this year. At this time the project has been introduced to MUD (Omaha), the City of Lincoln, and LPNNRD and the LPSNRD. While all are interested in the project, they are awaiting realized results. At that point, funding requests can be negotiated. By receiving funding for this first phase, real results can be provided to these entities once completed and support can be gathered across the State of Nebraska for the full three phase implementation. Also, last year the Lower Loup NRD approved supporting this project when it involved multiple Irrigation District's. Since this application has been redone to include only one District, an official proposal has not yet been re-introduced to them. Communication with all entities has been in the form of a presentation, emails and phone conferences to which no rejection letter were sent but additional result requested. Upon future results, support of the project will be considered.

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 $3,308,436 is for 60% of the expected project value of $5,514,060. It is anticipated that an additional $2,000,000 will be received from a Federal NRCS Grant. The recipients of the NRCS Grant will be announced later this fall. The remainder is $205,624 which will be provided from the Farwell Irrigation District budget if additional funds from other stakeholders aren't received. If only Water Sustainability Funds are received, the Farwell Irrigation District Board will consider the option of raising their District rates or Bonding.

5. Support/Opposition

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

Details of the project have been provided to MUD (Omaha), the City of Lincoln, LLNRD, LPNNRD and LPSNRD. All expressed interest in the project and would consider official support once the benefits can be provided.