

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Middle Republican Natural Resources District High Tech Irrigation Implementation Phase 2

PRIMARY CONTACT INFORMATION

Entity Name: Middle Republican NRD

Contact Name: Sylvia Johnson

Address: 220 Center Ave, P.O. Box 81, Curtis, NE 69025

Phone: 308-367-4281

Email: sjohnson@mrnrd.org

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

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

Grant amount requested. \$ 250,000.00

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.](#)

Are you requesting less than 60% cost share from the fund?

Yes.

If so what % ? 50%

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

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

N/A Obtained: YES NO

Surface Water Right

N/A Obtained: YES NO

USACE (e.g., 404 Permit)

N/A Obtained: YES NO

Cultural Resources Evaluation

N/A Obtained: YES NO

Other (provide explanation below)

N/A Obtained: YES NO

[Click here to enter text.](#)

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.

If yes, describe the changes that have been made since the last application. We are asking for a smaller amount.

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

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](#));

[Click here to enter text.](#)

A description of all field investigations made to substantiate the feasibility report ([004.01 B](#)); [Click here to enter text.](#)

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report ([004.01 C](#)); [Click here to enter text.](#)

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

[Click here to enter text.](#)

A discussion of each component of the final plan including, when applicable ([004.01 E](#));

Required geologic investigation ([004.01 E 1](#)); [Click here to enter text.](#)

Required hydrologic data ([004.01 E 2](#)); [Click here to enter text.](#)

Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria ([004.01 E 3](#)). [Click here to enter text.](#)

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](#));

Currently producers may have a soil moisture probe, or a remote sensing water flow meter, or access to ET data or the NeRain site, etc. There are Federal, State and local programs that might help with cost sharing for some of these specific items. This is the first real attempt to make all of this information available to any interested irrigator. The MRNRD considered several options to pursue and the discussion developed to wanting to work with producers for their

benefit as well as the benefit of the NRD. Having access to real time data, producers can make the best possible management decisions and the NRD can follow actual real time water use. The most important benefit lies with the conservation and preservation of the groundwater in the MRNRD.

A description of field or research investigations utilized to substantiate the project conception (004.02 B);

The MRNRD has been involved with an NET grant with the University of Nebraska Water Center on studying the benefits of high intensity irrigation. The results of this work and other related studies show a potential of 1-2 inches of irrigation savings.

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).

No anticipated effects on any structural measures.

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 is to hire consultants to spend the time in the field on a daily basis to measure and record the same information. This would be less efficient and not as current or accurate as the proposed High Tech system. This is the only complete tool that we have found within the industry for these systems. There are currently several efforts in the MRNRD and the State that address some of these items independently. NRCS cost shares for soil moisture probes, not for total systems, the MRNRD is looking at remote accessing irrigation flow meters, ET data is being published, NeRain sites are used, etc. This project will pull as many items as possible together for a site specific data source that will result in accurate and increased water management that is not available in any other form.
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). [Click here to enter text.](#)
 - 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). [Click here to enter text.](#)
 - 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). [Click here to enter text.](#)
 - 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). [Click here to enter text.](#)
4. Provide evidence that sufficient funds are available to complete the proposal. [Click here to enter text.](#)
 5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace).
N/A
 6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.
N/A
 7. Describe how the plan of development minimizes impacts on the natural environment.
The proposed High Tech project will reduce the irrigation impact on the available groundwater and surface water resource in the MRNRD. Water that is not pumped from the ground will be available in subsequent years and water not used from surface irrigators can be stored for use in the following years.
 8. Explain how you are qualified, responsible and legally capable of carrying out the project for which you are seeking funds.
The MRNRD is the legal entity in regulating and controlling groundwater use within its boundaries. The MRNRD is legally required to

recognize and assist with Natural Resources Management that affects the public. The MRNRD along with the Nebraska Department of Natural Resources in accordance with the Nebraska Ground Water Management and Protection Act, Neb. Rev. Stat. 46-701 to 46-753 (Reissue 2004), prepared the Integrated Management Plan (IMP). In July, 1996, the MRNRD and the other three natural resources Districts (NRDs) in the Republican River Basin, pursuant to then Section 46-656.28 of the Nebraska statutes, initiated a joint action planning process with the Department of Water Resources (DWR), the predecessor agency to DNR. In accordance with that process, DWR first made a preliminary determination in 1996 that “there was reason to believe that the use of hydrologically connected ground water and surface water resources is contributing to or is in the reasonably foreseeable future likely to contribute to disputes over the Republican River Compact.” When the studies required by Section 46-656.28 had been completed, DNR issued its conclusions on May 20, 2003, in the form of a report entitled: “Republican River Basin, Report of Preliminary Findings.” Those conclusions included the following determination: Pursuant to Section 46-656.28 and the preliminary findings in this report, the Department determined that present and future Compact disputes arising out of the use of hydrologically connected ground water and surface water resources in the Republican River Basin could be eliminated or reduced through the adoption of a joint action plan. Following four hearings on that report, DNR made final the preliminary conclusions in the report and the four basin NRDs were so informed. The MRNRD and the other three NRDs each then adopted orders to proceed with developing a joint action plan for Integrated Management of hydrologically connected surface water and ground water resources in the Basin; preparation of a joint action plan for the MRNRD began soon thereafter. The Nebraska Legislature adopted LB962 in April of 2004 and it was signed by Governor Johanns on April 15, 2004, and became operative on July 16, 2004. That bill repealed Section 46-656.28 and replaced it with legislation providing for a revised process for addressing hydrologically connected surface water and groundwater resources. In order to avoid the need to begin anew the IMP processes that had been commenced but not completed under Section 46-656.28, LB962 provided for that transition of those ongoing planning processes into the newly enacted process now codified as Sections 46-713 to 76-719. The MRNRD and DNR agreed that preparation of a joint action plan had not been completed prior to July 16, 2004; therefore, subsection (3) of what is codified as Section 46-720, governs that transition. Completion of this plan proceeded under the new process and this plan was adopted in accordance with Section 46-718.

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

In September of 2014 the Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process was developed. This document provides information on several key areas of Department water planning activities, including current and future activities regarding information, data, and analysis capabilities, as well as water resources planning and

management. The Water Resources Cash Fund is used to support water management efforts in fully appropriated or over-appropriated basins. These funds can be utilized to aid management actions taken to reduce consumptive uses of water, or to enhance streamflow's or groundwater recharge. Of the goals within the Water Sustainability Fund this project meets several, such as, flood control, reducing aquifer depletion, mitigating threats to drinking water, the approval of an integrated management plan and groundwater management plan, the contribution of water supply management goals such as agricultural uses, municipal and industrial uses, recreational benefits, wildlife benefits, conservation, and preservation of water resources. Our project also meets the goals of enhancing water quality, most cost effective solutions available and interstate compacts. The MRNRD feels that by implementing these wireless irrigation technology systems that we are allowing our producers to properly use the precious natural resource of water in a more efficient manner. By avoiding over or under watering their crops, being able to set alarms for critical events, make timely decisions about power, fertilizer, chemicals, and more. These systems can also allow the farmers to receive data anywhere and anytime whether they are at home, in the office, in the field, or on the road. We also feel that the MRNRD producers have been given the restrictions and implications that they are preserving the water resource by abiding their allocations and then ensuring that they are protecting the water from over use. These systems will help take the protection of the precious natural resources to a higher level of efficiency with less water in the meantime.

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 MRNRD, along with the Nebraska Department of Natural Resources, in accordance with the Nebraska Ground Water Management and Protection Act, Neb. Rev. Stat. 46-701 to 46-753 (Reissue 2004), prepared the Integrated Management Plan (IMP). In July, 1996, the MRNRD and the other three natural resources Districts (NRDs) in the Republican River Basin, pursuant to then

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12. Identify the probable environmental and ecological consequences that may result as the result of the project.
There are no known probable consequences that could result from this project. If anything, it will help the environment.

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.

The Middle Republican Natural Resources District (MRNRD) has enforced chemigation permitting since 1986 when the law was created. We have a current on-going chemigation program that our producers all participate in if they do any

kind of chemigation. We currently take water samples District wide in the fall and send them off to a laboratory to check the nitrogen quality. The MRNRD will help provide the producers the ability to manage their irrigation systems by reducing the amount of leaching that might occur with over irrigating in times when it is not needed. By installing this unit on an irrigated field a producer has many applications to choose from that he/she can implement. One of the applications we are utilizing is the Integrated Pest Management (IPM). This application is for accurate timing in application of fungicides, pesticides, or other inputs which help reduce labor and material costs, sustains crop health and minimizes possible effects to the environment. Also, the producer can install a wind speed monitor which provides a producer the ability to check the wind at a field they may want to do some spraying on. This could have a significant effect on many farm management processes with agriculture spraying which could create drifting that could contaminate other water sources. To add additional help to the area of quality to the local water source, the MRNRD has installed additional weather stations so that the producers have adequate coverage for the things that help make their operations whole. Protecting groundwater as a drinking source for the people of the MRNRD is a high priority to the District. We also protect surface and groundwater quality by working with landowners to properly seal abandoned irrigation wells. The MRNRD is committed to making the District as whole as it can be. We currently have procedures in place that we have followed for years but also feel that it takes all pieces of the puzzle to make it complete. By using these wireless irrigation systems we are just adding to the advancement in the tech world to help us become more efficient as it is a core element in sustainability.

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 MRNRD recently just adopted their third generation IMP and has had a Groundwater Management Plan since 1986. The IMP addresses a specific pumping standard to meet the recent Supreme Court Decisions in managing the Republican River Compact and consumptive use. Irrigators now have a tool that can help them manage the need for irrigation. Knowing the moisture in the soil will assist the MRNRD in meeting its pumping standard. Past actions have been irrigation acre reductions, moratorium on new irrigation wells, certified irrigated acres with no new acres being added and installment of irrigation meters on all of the irrigation wells. The MRNRD is committed to having a purpose of sustaining a balance between water users and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin can be

achieved and maintained for both the near term and long term. Having said this, the wireless irrigation equipment is another piece to making the puzzle complete. One of the objectives we set forth in our newly adopted IMP in January of 2016 was that we would prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the District. Our objective for this new tool is to help us become more efficient by doing more with less water usage. The MRNRD feels that efficiency is one of the core elements of sustainability. We also set another objective that we would assist in ensuring long-term Compact compliance, reduce existing groundwater use within our District by 20 percent from the 1998 to 2002 baseline pumping volumes under average precipitation conditions so that, when combined with streamflow augmentation and incentive programs, the MRNRD's groundwater depletions are maintained within our portion of Nebraska's allowable groundwater depletions as computed through use of the Republican River Compact Administration Groundwater Model. Additionally, voluntary reductions in baseline pumping volumes will continue to be pursued by the District with the incentive of limiting the level of long-term management actions that are necessary during Compact Call years. We feel that this is a great voluntary project that can help the District as well as the producers become better managers for conserving and preserving the great natural resource water so that we will be able to enjoy it for generations to come. Through our IMP, we also have committed to reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use. This voluntary project is for producers to take their water management to a higher level, but this is all to the extent funds are available, so by applying for the water sustainability funding our District can get as many of these systems out into the fields. In cooperation with the State of Nebraska and the other NRD's, we have made it a goal to maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003. We will ensure that groundwater and surface water users within the MRNRD assume their share, but only their share, of the responsibility to keep Nebraska in compliance with the Compact and we firmly believe that by implementing these systems on irrigation wells and a producer being able to cut their usage back by a couple inches will help in meeting this goal. By the MRNRD providing its share of compliance responsibility and impacts to streamflow be apportioned within the District in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences does fit this new technology upgrade to our water usage. Within our IMP we set a goal to reserve and protect any increases to streamflow available from regulations or supplemental programs, enacted or implemented to maintain Compact Compliance, from any use that would negate the benefit of such regulations or programs, to the extent allowed by statute and the surface water controls of our IMP. To help maintain this goal, we are now using these tools to implement our producers irrigation wells in a sense that they could use less water whether it is surface or ground waters.

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 High Tech Irrigation Project, which is now in place, allows the MRNRD to meet their goal of reducing any unnecessary aquifer depletions. We do recognize there are areas in the MRNRD with an excess of 25 foot declines in the water table. The MRNRD has completed a modeling project on the Medicine Creek Watershed. This Medicine Creek Watershed Model was created to develop a calibrated transient groundwater flow model of the Medicine Creek Basin. By developing this robust tool for our Board of Directors, we will be able to use it for a more scientific based answer. Examples of this could be to evaluate future management strategies that support groundwater allocations that minimize declines in aquifer water levels, maintaining compliance, optimizing the use of surface water or groundwater resources within the basin. This model will help the Board of Directors identify the quality of water that can be used for irrigation and maintain a stable and sustainable water table. If the Board of Directors have to enforce different allocations per watershed in our District, this project would help the producers avoid over or under watering their crops by using this technology. By receiving this data anywhere and anytime it will help the producer make timely decisions about power, fertilizer, chemicals and more. This project compliments that model by providing a tool to irrigators helping them to achieve a level of irrigation that protects the aquifer. The MRNRD firmly believes that efficiency is one of the core elements to be sustainable. By maintaining a sustainable aquifer level, it will allow the hydrologically connected areas to maintain surface flow or potentially increase streamflow.

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 High Tech Irrigation Project will provide benefits to all of the above factors for our District. The MRNRD currently has thirty four flood control

structures that are strategically located throughout the District to help prevent flooding as a result of sudden and heavy rain events. The structures are designed to catch runoff and release it slowly into the natural drainage system. The project contributes to the flood control aspect of the District in a sense that not over applying water will reduce the amount of runoff from rainfall. This system has the capability to have the application of Water Level Monitoring and this feature can show water levels in remote tanks, reservoirs, stock ponds, and canals that can be monitored with cost effective wireless water level monitoring. This provides Managers and the District's Staff with up-to-date information on supply conditions, making more efficient use of the water resources. The project contributes to the agricultural use aspect of the District in a way that the unit can have different applications installed to use at the site of the unit. These applications are as follows: Soil Moisture Monitoring- Soil moisture data shows what is happening in the active root of a crop. With this data growers and irrigators can view site-specific crop water use, track the depth of irrigation applications and adjust irrigation to match what is needed; Weather Monitoring – wireless weather monitoring accurately tracks site specific conditions such as temperature, relative humidity, wind speed and direction, precipitation and more, enabling growers to adjust crop and irrigation practices accordingly for optimum results; Frost Monitoring- Timely actions during a frost period can make or break a season. Wireless Frost Monitoring gives growers access to critical temperature and relative humidity changes so immediate protective action can be taken to avoid crop damage; Evapotranspiration – Accurately determine irrigation needs by knowing how much water is lost through evaporation and transpiration. Wireless ET monitoring uses local weather conditions, along with a crop and growth state factors, to provide managers with a calculated plant water use; Integrated Pest Management- IPM is an effective and environmentally sensitive approach to pest management. Accurate timing in application of fungicides, pesticides, or other inputs help reduce labor and material cost, sustains crop health and minimizes possible effects to the environment; Pump Monitoring – With wireless pump monitoring, using system pressures and flow rates, growers can track pump performance and receive immediate alerts to potential clogs or leaks so quick action can be taken to avoid costly downtime and wasted resources; Automatic Meter Reading- Manual data collecting can be costly and time consuming. Streamline the meter reading process, improve operational efficiency and reduce labor and other costs associated with manual meter reading by knowing how much water is used daily, weekly and monthly; Water Level Monitoring – Water levels in remote tanks, reservoirs, stock ponds and canals can be monitored cost-effectively with wireless Water Level Monitoring, providing managers and staff with up-to-date information on supply conditions, making more efficient use of the water resources. Municipal and Industrial Uses fits this project as well in a sense that local towns can make sure that they have adequate safe water supply. This wireless irrigation and crop management tool allows towns to implement the Integrated Pest Management application to their wells they may use for drinking water. By using this it will help minimize possible effects that could happen to the environment. There are significant benefits to our

NRD District to have Recreation within it. The MRNRD did an economic study in 2012 that showed without having had irrigation we would have been without \$363 million in total economic output within our local economies. To put this into an easier way to understand, that would have meant that an average of \$509 per acre would have been lost and the economic benefit is enough to buy everyone in the MRNRD 373 tanks of gas at the time. The District needs to implement these wireless irrigation technologies to help reduce the irrigation usage to a manageable level to ensure its longevity to the community. Without having this economic output producers and citizens of our local towns would have been less likely to use our local recreational activities such as lakes, parks, golf courses, and much more. Keeping our local economic vitality going takes Non-farm jobs created and supported to keep the local dollar circulating such as the food service, wholesale trade businesses, banking activities, real estate, doctors and dentists, hospitals, retail stores, nursing and care facilities, truck transportation, and more. By using the Integrated Pest Management (IPM) application on the producers wireless irrigation equipment they would be helping maintain the safety of wildlife habitat. This application is an effective and environmentally sensitive approach to pest management. By having this accurate timing in application of fungicides, pesticides, or other inputs helps reduce labor and material costs, sustains crop health and minimizes possible effects to the environment. The MRNRD feels that by implementing these wireless irrigation technology systems that we are allowing our producers to properly use the precious natural resource of water in a more efficient manner. By avoiding over or under watering their crops, being able to set alarms for critical events, make timely decisions about power, fertilizer, chemicals, and more. These systems also allow the farmers to receive data anywhere and anytime whether they are at home, in the office, or in the field, or on the road. We also feel that the MRNRD producers have been given the restrictions and implications that they are preserving the water resource by abiding their allocations and then ensuring that they are protecting the water from over use. These systems will help take the protection of the precious natural resources to a higher level of efficiency with less water in the meantime.

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 MRNRD has a land area that covers 3,843 square miles or 2,459,520 acres. When you classify out the total land mass we have 54% rangeland, 33.5% dry land farming, and 12.5% is irrigated farming. We have retired 5000 plus irrigated acres within our District's boundaries. The MRNRD is currently checking 150 plus monitoring wells and constantly adding more to monitor our

groundwater levels. The MRNRD also controls and maintains 34 flood control structures. With all these facts in mind we are really in good shape given our only 12.5% irrigated lands and the usage that we have had on those lands. The MRNRD has had allocations since 2005 and still implementing them today. We have had 3 different allocation periods thus far for years 2005 – 2007; 2008 – 2012; and 2013 – 2017. The allocation periods are set forth by the MRNRD’s Board of Directors and then the producers abide by them. As a whole our average usage per year is as following: 2005 – 8.81; 2006 – 10.01; 2007 – 8.23; 2008 – 8.90; 2009 – 8.14; 2010 – 7.85; 2011 – 8.44; 2012 – 16.78; 2013 – 10.13; 2014 – 9.07; 2015 – 9.75; 2016 – 10.25; 2017 – 10.84. As our whole District, and most of Nebraska, experienced extreme drought in 2012 it taught our producers a great deal on education of water usage and how far it will go. Our producers are at level that took extreme conditions to get there and learn how to read their meters that are installed at every irrigation well in our District. By being able to give this wireless irrigation and crop management tool to our producers will help them take their water usage a notch further by knowing what is happening in the active root zone of a crop and that data that is collected to know their real time water usage. The local producers within our District are doing a great amount in maximizing the resource for the state, future generations, and small town viability. The MRNRD also has recently completed a watershed basin model within our boundaries, which was the Medicine Creek Watershed. This was developed as a calibrated transient groundwater flow model of the Medicine Creek Basin and built to be a robust tool for the Board of Directors to be able to use for decision making with a more science based answer. They will be able to use it for future evaluation management strategies that support groundwater allocations that minimize declines in aquifer water levels, maintaining compliance, optimizing the use of surface water or groundwater resources within the basin. The model shows actual usage to support sustainable water levels of 8”-10”, this is less than the allocation set by the MRNRD and our producers are currently managing at this sustainable level. By the District having all of these tools in the tool box, we are just reaching our overall goal of efficiency to result in being a sustainable Natural Resource District. These tools are helping in the conservation of the natural resource and that will result in overall long term preservation that will allow our local water users and their water supplies to be there for generations to come.

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 costs are an initial \$10,000 per High Tech Unit. The annual maintenance and transmission costs will be paid by the producer. The MRNRD will also provide an intern assigned to assist with the implementation of the

project. The target is to install 40 units in the first year and 10 the following year for a total cost of \$500,000. The benefits of these High Tech systems is varied and high. There will be an economic benefit realized by the MRNRD staying in compliance and being able to continue to use irrigation in perpetuity. The resource benefit has a long and real benefit. By using this High Tech System, in conjunction with better decisions by the MRNRD board, there will be a sustainable water supply that benefits not only the water resource but all resources that rely on water. Reducing applied irrigation by 1-2 inches will save costs and inputs. If the same type of information was to be available to the producer it would take a person to manually read soil moisture monitors on a quarter hour basis, a person to monitor water flow readings every 15 minutes, etc. This project pulls all the available tools and technology together providing the producer and the NRD the ability to manage their water at a level only very few have achieved. It is difficult to describe how cost effective a project is when the alternative is to not put the system in. The MRNRD is committed to ensuring this investment in the future will be successful by committing an intern or staff person to follow-up and work with producers to work through concerns and find the answers.

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 MRNRD has goals and objectives within our IMP that we are required to by state statue. We have the purpose of sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin and this can be achieved and maintained for both the near term and the long term. The District has the responsibility under statute, including meeting the obligations under the Final Settlement Stipulation, by adopting revised rules to implement our IMP with regulations and other supplemental programs. We are wanting to incorporate these wireless irrigation technologies into our District to be an additional supplemental program to help us meet the state law of meeting compact compliance. We feel this is a good supplemental program because of all the different applications a producer can put on the system to help themselves lower their water usage by this efficient set-up. The MRNRD has had allocations since 2005 and still implementing them today. We have had 3 different allocation periods thus far they have been years 2005 – 2007; 2008 – 2012; and 2013 – 2017. The allocation periods are set forth by the MRNRD's Board of Directors and then the producers abide by them. As a whole our average usage per year is as

following: 2005 – 8.81; 2006 – 10.01; 2007 – 8.23; 2008 – 8.90; 2009 – 8.14; 2010 – 7.85; 2011 – 8.44; 2012 – 16.78; 2013 – 10.13; 2014 – 9.07; 2015 – 9.75; 2016 – 10.25; 2017 – 10.84. As our whole District and most of Nebraska experienced extreme drought in 2012, it taught our producers a great deal on education of water usage and how far it will go. Our producers are at level that took extreme conditions to get there and learn how to read their meters that are installed at every irrigation well in our District. By being able to give this wireless irrigation and crop management tool to our producers, it will help them take their water usage a notch further by knowing what is happening in the active roll zone of a crop and that data that is collected to know their real time water usage. The local producers within our District are doing a great amount in maximizing the resource for the state, future generations, and small town viability. The MRNRD recently just adopted their third generation IMP and has had a Groundwater Management Plan since 1986. The IMP addresses a specific pumping standard to meet the recent Supreme Court Decisions in managing the Republican River Compact and consumptive use. By providing the necessary tools to irrigators that can help them manage the need for irrigation when only needed by knowing the soil moisture that is available to the crop will assist the MRNRD in meeting its pumping standard. Past actions have been irrigation acre reductions, moratorium on new irrigation wells, certified irrigated acres with no new acres being added and installment of irrigation meters on all of the irrigation wells. The MRNRD is committed to having a purpose of sustaining a balance between water users and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin can be achieved and maintained for both the near term and long term. Having said that the wireless irrigation equipment is a piece another piece to making the puzzle complete. In cooperation with the State of Nebraska and the other NRD's we have made it a goal to maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003. We will ensure that groundwater and surface water users within the MRNRD assume their share, but only their share, of the responsibility to keep Nebraska in compliance with the Compact and we firmly believe that by implementing these systems on irrigation wells and a producer being able to cut their usage back by a couple inches will help in meeting this goal. By the MRNRD providing its share of compliance responsibility and impacts to streamflow be apportioned within the District in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences does fit this new technology upgrade to our water usage. Within our IMP we set a goal to reserve and protect any increases to streamflow available from regulations or supplemental programs, enacted or implemented to maintain Compact compliance, from any use that would negate the benefit of such regulations or programs, to the extent allowed by statute and the surface water controls of our IMP. To help maintain this goal we need to be using tools such as the one we are wanting to implement on our producers irrigation wells in a sense that they could use less water whether it is surface or ground waters. One of the objectives we set forth in our newly adoption IMP in January of 2016 was that we would prevent the initiation of

new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the District. Having said that objective we feel that this new tool will help us become more efficient by doing more with less water usage. We also set another objective that we would assist in ensuring long-term Compact compliance, reduce existing groundwater use within our District by 20% from the 1998 to 2002 baseline pumping volumes under average precipitation conditions so that, when combined with streamflow augmentation and incentive programs, the MRNRD's groundwater deletions are maintained within our portion of Nebraska's Allowable Groundwater Depletions as computed through use of the Republican River Compact Administration Groundwater model. This reduction of 20% in the amount of irrigation water that was pumped from 98-02 was 250,905 acre feet, this pumping standard is critical in helping the District meet the Republican River Compact with Kansas and Colorado. Reducing the amount of water pumped will be credit to Nebraska for compact compliance. If we could make a reduction in irrigation by up to 2 inches a year off our total average usage in the District we could be up to 40,000 plus acres feet per year savings. Currently, the MRNRD has in place several policies and regulations helping meet the pumping standard such as the implementation of a moratorium on new wells, certified acres, allocations, etc. Additionally, voluntary reductions in baseline pumping volumes will continue to be pursued by the District with the incentive of limiting the level of long-term management actions that are necessary during Compact Call years. We feel that this is a great voluntary project that can help the District as well as the producers all become better managers for conserving and preserving the great natural resource water so that we will be able to enjoy it for generations to come. Through our IMP we also have committed to reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use, this voluntary project is for producers to take their water management to a higher level but this is all to the extent funds are available. By applying for the water Sustainability Funding our District can get as many of these systems out into the fields. Providing this additional tool to the MRNRD producers could lead up to a 2 inch saving per year that will not only help meet the pumping standard within our IMP but also address aquifer depletions and surface flows.

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.

By the MRNRD providing this additional tool to our local producers, we will be more likely to ensure the long term availability of the aquifer. Implementing these wireless irrigation and crop management systems allows the District to do more with less. By doing more with high end technology efficiencies and using less water, it will result in savings of the aquifer. If we can ensure that there will be a sustainable aquifer for generations to come, we will ensure our District's small towns viability. To the MRNRD the answer to this question is so much more than just maintaining water usage. If you look at the Nebraska Department of Agriculture website, they have a "Nebraska Ag Facts Brochure" within that there is so much to Nebraska that is driven from agriculture. Nebraska's agriculture has been described as expansive and diverse with an abundance of natural resources. The State is setup to support all types of agriculture, including an abundant water supply and ample amounts of cropland and pasture. Majority of Nebraskan's would say that the States most important asset is the people that live in it. Most farms and ranches within the State have been passed down from generation to generation making those farming and ranching families still serve as the hub of the State's industry being agriculture. Agriculture brings a good majority of jobs to the State including areas of insurance, equipment sales and repair, technology, irrigation, engineering and many more. These agri-businesses are vital to the State's economy to maintain and expand the State. According to the brochure by the Nebraska Department of Agriculture the state also has the infrastructure needed to transport grain, livestock and all types of agricultural products raised within the State. Having the railroads, semis, trucks, and other vehicles provides the necessary pathways to move from one side of the State to the other. Corn and cattle are two of the top commodities produced in Nebraska. Having the available supply of corn as feed for the cattle results in producing premium-quality meat products. By having this accessibility to feed within the State and producing those premium-quality meats, the state has been number one in commercial red meat production. Corn feeding allows the producers within the State to produce more marbling and tenderness in the final beef product. The Corn-fed beef is known worldwide for its flavor, tenderness and quality. Also found in the brochure is one of Nebraska's most vital natural resources which is its massive supply of groundwater. The Ogallala Aquifer stretches through parts of eight states but most of its abundant supply is located within Nebraska and this has been essential to the success of agriculture within the State. Center pivot irrigation is the most common method of irrigating in today's world and as a result of this, four of the largest manufacturers in the center pivot systems in the world, reside in Nebraska. This is a huge part of Nebraska's economy as well as making the infrastructure in the State all the more important to be here and maintained. The accessibility to this aquifer also is vital to the states livestock and diary production as well. Nebraska is also the second largest in ethanol production within the nation. The linkage between the corn, ethanol, and livestock production within the State has become known as the "Golden Triangle". The "Golden Triangle" provides significant opportunity to add value at every step along the production chain. The ethanol production is important for

domestic livestock feed ingredient as well as a foreign export product. Another important aspect to the State of Nebraska is our transportation infrastructure as we had mentioned before, this is critical in the success of our States agriculture. We have major railroad lines Union Pacific and BNSF, Interstate 80, major airports, a barge transportation along the Missouri River and several other major highways. The transportation makes it all the more vital to produce the agriculture products we do within the State due to the accessibility of moving the product. The “Cornhusker State” prides itself on its corn production. Corn is the most common crop raised within the State and part of that is because of all the uses there is for it. Feeding livestock and poultry, producing ethanol, distiller’s grains and even bioplastics is some of the uses for corn. The State is third largest producer of corn in the country, second in ethanol production and distillers grains, second in cow-calf production and first in cattle on feed. All of these national ratings to the State of Nebraska means that we are doing things right within the State. We have the water supply, lands, infrastructures, and resources to make this happen, so we need to keep on conserving and preserving this great land and resources we have come to make great things of. Today’s corn farmers grow 87% more corn per ounce of fertilizer than they did 30 years ago and have cut erosion by 44% through new tillage practices. This is huge for Nebraska’s Natural Resources Districts and some of it is because of the role of the NRD’s as well. There is so much more to the State that is so important in agriculture such as the soybean, wheat, hay, alfalfa, popcorn, dry edible beans, sugar beets, potatoes, grain sorghum, and proso millet productions. All of these productions help maintain a tax base for counties to sustain their local roads, bridges, and schools which make Nebraska a viable State to be in. As Governor Pete Ricketts said in his 2016 State of the State speech “Agriculture is our largest industry representing nearly 25% of the State’s economy. We need to grow Nebraska’s economy, create more and better paying jobs, keep our kids and grandkids here, and attract people from all over the country to come and make Nebraska their home. Our three largest industries are agriculture, manufacturing, and tourism and they all require a strong transportation infrastructure to expand.” He also said that “he had announced a proposal for a transportation infrastructure bank to speed up expressway construction, improve county bridges, and assist companies with economic development. Our businesses transport our goods and services. Our farmers and ranchers deliver the food to feed our world on our roads and bridges. We get to work each day on our highways. We drive our children to school over our county bridges. Let’s help local leaders keep and attract businesses.” This really hits local to the MRNRD as we share the same passion for Nebraska Ag as Governor Pete Ricketts does and that we need to continue growing and sustaining it. All this being said about Nebraska Agriculture, we feel this is one more tool and step toward a more sustainable tomorrow for the future of our District. By using this high tech irrigation equipment, we will become better managers of the resources we have and want to sustain for generations to come. This will help ensure our local tax base so there is funding for infrastructure like our local roads, bridges, schools, and local businesses.

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.

The MRNRD has enforced chemigation permitting since 1986 when the law was created. We have a current on-going chemigation program that our producers all participate in if they do any kind of chemigation. We currently take water samples District wide in the fall and send them off to a laboratory to check the nitrogen quality. The MRNRD will help provide the producers the ability to manage their irrigation systems reducing the amount of leaching that might occur with over irrigating in times when not needed. By installing this unit on an irrigated field a producer has many applications to choose from that he/she can implement. One of the applications that can be utilized is the Integrated Pest Management (IPM). This application is for accurate timing in application of fungicides, pesticides, or other inputs helps reduce labor and material costs, sustains crop health and minimizes possible effects to the environment. Also, the producer can install a wind speed monitor which provides a producer ability to check the wind at a field they may want to do some spraying on. This could have a significant effect on many farm management processes with agriculture spraying which could create drifting that could contaminate other water sources. To add additional help to the area of quality to the local water source, the MRNRD has installed additional weather stations so that the producers have adequate coverage for the things that help make their operations whole. Protecting groundwater as a drinking source for the people of the MRNRD is a high priority to the District. We also protect the quality of surface and groundwater by working with landowners to properly seal abandoned irrigation wells. The MRNRD is committed to making the District as whole as it can be. We currently have procedures in place that we have followed for years but also feel that it takes all pieces of the puzzle to make it complete. By using these wireless irrigation systems we are just adding to the advancement in the tech world to help us become more efficient as it is a core element in sustainability. Reducing the amount of irrigation by 1"-2" per acre can reduce the amount of leaching by 15-20% so therefore can reduce the amount of nitrogen applied.

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 MRNRD along with the Nebraska Department of Natural Resources in accordance with the Nebraska Ground Water Management and Protection Act, Neb. Rev. Stat. 46-701 to 46-753 (Reissue 2004), prepared the IMP. In July, 1996, the MRNRD and the other three natural resources Districts (NRDs) in the Republican River Basin, pursuant to then Section 46-656.28 of the Nebraska statutes, initiated a joint action planning process with the Department of Water Resources (DWR), the predecessor agency to DNR. In accordance with that process, DWR first made a preliminary determination in 1996 that “there was reason to believe that the use of hydrologically connected ground water and surface water resources is contributing to or is in the reasonably foreseeable future likely to contribute to disputes over the Republican River Compact.” When the studies required by Section 46-656.28 had been completed, DNR issued its conclusions on May 20, 2003, in the form of a report entitled: “Republican River Basin, Report of Preliminary Findings.” Those conclusions included the following determination: Pursuant to Section 46-656.28 and the preliminary findings in this report, the Department determined that present and future Compact disputes arising out of the use of hydrologically connected ground water and surface water resources in the Republican River Basin could be eliminated or reduced through the adoption of a joint action plan. Following four hearings on that report, DNR made final the preliminary conclusions in the report and the four basin NRDs were so informed. The MRNRD and the other three NRDs each then adopted orders to proceed with developing a joint action plan for Integrated Management of hydrologically connected surface water and ground water resources in the Basin; preparation of a joint action plan for the MRNRD began soon thereafter. The Nebraska Legislature adopted LB962 in April of 2004 and it was signed by Governor Johanns on April 15, 2004, and became operative on July 16, 2004. That bill repealed Section 46-656.28 and replaced it with legislation providing for a revised process for addressing hydrologically connected surface water and groundwater resources. In order to avoid the need to begin anew the IMP processes that had been commenced but not completed under Section 46-656.28, LB962 provided for that transition of those ongoing planning processes into the newly enacted process now codified as Sections 46-713 to 76-719. The MRNRD and DNR agreed that preparation of a joint action plan had not been completed prior to July 16, 2004; therefore, subsection (3) of what is codified as Section 46-720, governs that transition. Completion of this plan proceeded under the new process and this plan was adopted in accordance with Section 46-718. The MRNRD has a 3.2144 mil levy. The MRNRD is in an area that is 12.5% irrigated with approximately 50% range/pastureland. The Republican River Basin has been found to be fully appropriated and therefore subject to irrigated occupation tax. Occupation Tax in the District has occurred as following 2007: \$7.04; 2010: \$4.90; 2011: \$8.50; 2012: \$9.43; and since 2013 the MRNRD has maxed out the occupation tax at the \$10.00/ acre level.

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.

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that preparation of a joint action plan had not been completed prior to July 16, 2004; therefore, subsection (3) of what is codified as Section 46-720, governs that transition. Completion of this plan proceeded under the new process and this plan was adopted in accordance with Section 46-718. Past actions have been irrigation acre reductions, moratorium on new irrigation wells, certified irrigated acres with no new acres being added, installment of irrigation meters on all of the irrigation wells. The MRNRD is committed to having a purpose of sustaining a balance between water users and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin can be achieved and maintained for both the near term and long term, having said this the wireless irrigation equipment is another piece to making the puzzle complete. One of the objectives we set forth in our newly adoption IMP in January of 2016 was that we would prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the District. This new tool assists us as we become more efficient by doing more with less water usage. The MRNRD feels that efficiency is one of the core elements of sustainability. We met our objective to assist in ensuring long-term Compact compliance, reduce existing groundwater use within our District by 20% from the 1998 to 2002 baseline pumping volumes under average precipitation conditions so that, when combined with streamflow augmentation and incentive programs, the MRNRD's groundwater deletions are maintained within our portion of Nebraska's Allowable Groundwater Depletions as computed through use of the Republican River Compact Administration Groundwater Model. Additionally, voluntary reductions in baseline pumping volumes will continue to be pursued by the District with the incentive of limiting the level of long-term management actions that are necessary during Compact Call years. We feel that this is a great voluntary project that can help the District as well as the producers all become better managers for conserving and preserving the great natural resource water so that we will be able to enjoy for generations to come. Through our IMP we have also committed to reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use, this voluntary project is for producers to take their water Management to a higher level, but this is all to the extent funds are available, so by applying for the water Sustainability Funding our District can get as many of these systems out into the fields. In cooperation with the State of Nebraska and the other NRD's we have made it a goal to maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003. We will ensure that groundwater and surface water users within the MRNRD assume their share, but only their share, of the responsibility to keep Nebraska in compliance with the Compact and we firmly believe that by implementing these systems on irrigation wells and a producer being able to cut their usage back by a couple inches will help in meeting this goal. By the MRNRD providing its share of compliance responsibility and impacts to streamflow be apportioned within the District in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences does fit this new technology

upgrade to our water usage. Within our IMP we set a goal to reserve and protect any increases to streamflow available from regulations or supplemental programs, enacted or implemented to maintain Compact compliance, from any use that would negate the benefit of such regulations or programs, to the extent allowed by statute and the surface water controls of our IMP. To help maintain this goal, we need to be using tools such as the one we are wanting to implement on our producers irrigation wells in a sense that they could use less water whether it is surface or ground waters.

Our ultimate goal that quantifies the target lands would be irrigated land that would accumulate up to 20,000 acres that would receive this benefit for the time being. We want to grow the number of acres in this project over the next several years. In terms of the usage of water we want to use this tool to lower our water usage that would then help address any declines, depletions, or help the hydrologically connected stay engaged together. Stakeholders involved in this project would be our groundwater users and all tax payers within the District. When looking at who benefits from this project we feel it's safe to say the State of Nebraska in terms of compact compliance we are obligated to upstand, the local producers, us as a District, and McCrometer in terms of gaining more knowledge about their products being out in the fields.

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.

This project helps address the concept of “doing more with less” so we don’t have a problem. These wireless irrigation and crop management systems are just another tool that a producer and NRD’s should have in their toolboxes so that we start addressing conservation and preserving one of the greatest natural resources that we have in the State of Nebraska. By being proactive and thinking outside of the box and implementing these systems, we will be more likely to sustain the great things Nebraska has to offer to its people. Water usage and becoming more efficient is something that producers in the MRNRD feel strongly about as they are the ones out in the field working long hours to make a profit. These wireless irrigation systems are something that we as a District want to give back to our producers and help thank them for being on the proactive side and being eager to learn more and do more all the time to become as efficient as possible. These systems provide our producers with a total system solution from one source. Whether the producer is wanting to monitor flow, soil moisture, water quality, ET, water quality, or other critical inputs, these accomplish important needs. We feel this will benefit the State of Nebraska in that others may look to us as a District and start seeing the things we are doing to be more conservative and

the things that are out there to use. It would have the trickling effect of just knowing what others are doing and then they might try and use these systems as well. Efficiency is one of the key elements of sustainability and if the whole State has this same goal and expectation to ensure one of Nebraska's greatest attributes being Agriculture. In the 2016 Legislative Session the State Senators passed a budget line that was up \$1.2 million for the Republican River Compact litigation, the MRNRD feels that we as a District should be implementing these kinds of tools for our producers to help take away from the lawsuits.

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.

If the WSF funding is not approved or available, the MRNRD will continue to pursue other funding alternatives. The MRNRD is committed to address their water concerns and will move ahead, either at a slower rate or with other funding, and install some of these systems in 2019 as funding allows.

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 MRNRD has completed a modeling project on the Medicine Creek Watershed. This Medicine Creek Watershed Model was created to develop a calibrated transient groundwater flow model of the Medicine Creek Basin. By developing this robust tool for our Board of Directors we are able to use it for a more science based answer. We are able to evaluate future management strategies that support groundwater allocations that minimize declines in the aquifer water levels, maintaining compliance, optimizing the use of surface water or groundwater resources within the basin. This model will help the Board of directors identify the quality of water that can be used for irrigation and maintain a stable and sustainable water table. If the Board of Directors have to enforce different allocations per watershed in our District this project would help the producers avoid over-or under-watering their crops by using this technology. By receiving this data anywhere and anytime can help in making timely decisions about power, fertilizer, chemicals and more. This project compliments that model by providing a tool to irrigators helping them to achieve a level of irrigation that protects the aquifer. The MRNRD firmly believes that efficiency is one of the core

elements of be sustainable. By maintaining a sustainable aquifer level it will allow the hydrologically connected areas to maintain surface flow or potentially increase streamflow. We also have watersheds such as the Red Willow, Stinking Water, Frenchman, Republican River, Beaver Creek, and Driftwood that the MRNRD would like to move this same modeling project within. After having the findings of the Medicine Creek Watershed and what is sustainable water use and by using these wireless irrigation and crop management systems, we can now address those levels of water usage that are suitable within a watershed.

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.

In September of 2014 the Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process was developed. This document provides information on several key areas of department water planning activities, including current and future activities regarding information, data, and analysis capabilities, as well as water resources planning and management. The Water Resources Cash Fund is used to support water management efforts in fully appropriated or overappropriated basins. These funds can be utilized to aid management actions taken to reduce consumptive uses of water, or to enhance streamflow's or groundwater recharge. Of the goals within the Water Sustainability Fund, this project meets several, such as, flood control, reducing aquifer depletion, mitigating threats to drinking water, the approval of an IMP and groundwater management plan, the contribution of water supply management goals such as agricultural uses, municipal and industrial uses, recreational benefits, wildlife benefits, conservation, and preservation of water resources. Our project also meets the goals of enhancing water quality, most cost effective solutions available and interstate compacts. The project contributes to the flood control aspect of the District in a sense that not over applying water will reduce the amount of runoff from rainfall. This system has the capability to have the application of Water Level Monitoring and this feature can show water levels in remote tanks, reservoirs, stock ponds, and canals that can be monitored with cost effective wireless water level monitoring. This provides Managers and the staff of District with up-to-date information on supply conditions and making more efficient use of the water resources. The Legislature also found that these goals can could be met by considering other programs and projects and such accumulation of research, data, and modeling could be part of that. This project will be a data collecting project for the producer to use for their own benefit. Also that conjunctive management and IMPs be of benefit to helping with projects and the MRNRD has been adopted these plans. Another that could help these goals is meeting compliance with interstate compacts and the project will help meet

those obligations by helping use less water. The project contributes to the agricultural use aspect of the District in a way that the unit can have different applications installed to use at the site of the unit. These applications are as follows: Soil Moisture Monitoring- Soil moisture data shows what is happening in the active root zone of a crop. With this data growers and irrigators can view site-specific crop water use, track the depth of irrigation applications and adjust irrigation to match what is needed; Weather Monitoring – Wireless weather monitoring accurately tracks site specific conditions such as temperature, relative humidity, wind speed and direction, precipitation and more, enabling growers to adjust crop and irrigation practices accordingly for optimum results; Frost Monitoring- Timely actions during a frost period can make or break a season. Wireless Frost Monitoring gives growers access to critical temperature and relative humidity changes so immediate protective action can be taken to avoid crop damage; Evapotranspiration – Accurately determine irrigation needs by knowing how much water is lost through evaporation and transpiration. Wireless ET monitoring uses local weather conditions, along with a crop and growth state factors, to provide managers with a calculated plant water use; Integrated Pest Management- IPM is an effective and environmentally sensitive approach to pest management. Accurate timing in application of fungicides, pesticides, or other inputs helps reduce labor and material cost, sustains crop health and minimizes possible effects to the environment; Pump Monitoring – With wireless pump monitoring, using system pressures and flow rates, growers can track pump performance and receive immediate alerts to potential clogs or leaks so quick action can be taken to avoid costly downtime and wasted resources; Automatic Meter Reading- Manual data collecting can be costly and time consuming. Streamline the meter reading process, improve operational efficiency and reduce labor and other costs associated with manual meter reading by knowing how much water is used daily, weekly and monthly; Water Level Monitoring – Water levels in remote tanks, reservoirs, stock ponds and canals can be monitored cost-effectively with wireless Water Level Monitoring, providing managers and staff with up-to-date information on supply conditions, making more efficient use of the water resources. Municipal and Industrial Uses fits this project as well in a sense that local towns can make sure that they have adequate safe water supply for their towns. This wireless irrigation and crop management tool allows towns to implement the Integrated Pest Management application to their wells they may use for drinking water. By using this it will help minimize possible effects that could happen to the environment. There are significant benefits to our NRD District to have Recreation within it. The MRNRD did an economic study in 2012 that showed without having had irrigation we would have been without \$363 million in total economic output within our local economies. To put this into an easier way to understand, that would have meant that an average of \$509 per acre would have been lost and the economic benefit is enough to buy everyone in the MRNRD 373 tanks of gas at the time. The District needs to implement these wireless irrigation technologies to help reduce the irrigation usage to a manageable level to ensure its longevity to the community. Without having this economic output producers and citizens of our

local towns would have been less likely to use our local recreational activities such as lakes, parks, golf courses, and much more. To keep our local economic vitality going, it takes Non-farm jobs created and supported to make the local dollar keep circulating such as the food service, wholesale trade businesses, banking activities, real estate, doctors and dentists, hospitals, retail stores, nursing and care facilities, truck transportation, and more. By using the IPM application on the producers wireless irrigation equipment, they would be helping maintain the safety of wildlife habitat. This application is an effective and environmentally sensitive approach to pest management. By having this accurate timing in application of fungicides, pesticides, or other inputs helps reduce labor and material costs, sustains crop health and minimizes possible effects to the environment. The MRNRD feels that by implementing these wireless irrigation technology systems, we are allowing our producers to properly use the precious natural resource of water in a more efficient manner. By avoiding over or under watering their crops, being able to set alarms for critical events, make timely decisions about power, fertilizer, chemicals, and more. These systems can also allow the farmers to receive data anywhere and anytime whether they are at home, in the office, out in the field, or on the road. We also feel that the MRNRD producers have been given the restrictions and implications that they are preserving the water resource by abiding their allocations and then ensuring that they are protecting the water from over use. These systems will help take the protection of the precious natural resources to a higher level of efficiency with less water in the meantime.

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 MRNRD recently just adopted their third generation IMP and has had a Groundwater Management Plan since 1986. The IMP addresses a specific pumping standard to meet the recent Supreme Court Decisions in managing the Republican River Compact and consumptive use portion. By providing the necessary tools to irrigators that can help them manage the need for irrigation only when needed by knowing the soil moisture that is available to the crop will assist the MRNRD in meeting its pumping standard. Past actions have been irrigation acre reductions, moratorium on new irrigation wells, certified irrigated acres with no new acres being added, installment of irrigation meters on all of the irrigation wells. The MRNRD is committed to having a purpose of sustaining a balance between water users and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin can be achieved and maintained for both the near term and long term. Having said this,

the wireless irrigation equipment is another piece to making the puzzle complete. In cooperation with the State of Nebraska and the other NRD's we have made it a goal to maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003. We will ensure that groundwater and surface water users within the MRNRD assume their share, but only their share, of the responsibility to keep Nebraska in compliance with the Compact and we firmly believe that by implementing these systems on irrigation wells and a producer being able to cut their usage back by a couple inches will help in meeting this goal. By the MRNRD providing its share of compliance responsibility and impacts to streamflow be apportioned within the District in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences does fit this new technology upgrade to our water usage. Within our IMP we set a goal to reserve and protect any increases to streamflow available from regulations or supplemental programs, enacted or implemented to maintain Compact compliance, from any use that would negate the benefit of such regulations or programs, to the extent allowed by statute and the surface water controls of our IMP. To help maintain this goal, we need to be using tools such as the one we are wanting to implement on our producers irrigation wells in a sense that they could use less water whether it is surface or ground waters. One of the objectives we set forth in our newly adoption IMP in January of 2016 was that we would prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the District. Having said that objective, we feel that this new tool will help us become more efficient by doing more with less water usage. We also set another objective that we would assist in ensuring long term Compact compliance, reduce existing groundwater use within our District by 20% from the 1998 to 2002 baseline pumping volumes under average precipitation conditions so that, when combined with streamflow augmentation and incentive programs, the MRNRD's groundwater deletions are maintained within our portion of Nebraska's Allowable Groundwater Depletions as computed through use of the Republican River Compact Administration Groundwater Model. This reduction of 20% in the amount of irrigation water that was pumped from 98-02 was 250,905 acre feet, this pumping standard is critical in helping the District meet the Republican River Compact with Kansas and Colorado. By reducing the amount of water pumped will be credited to Nebraska for compact compliance. If we could make a reduction in irrigation by up to 2 inches a year off of our total average usage in the District we could be up to 40,000 plus acres feet per year savings. Currently the MRNRD has in place several policies and regulations helping meet the this pumping standard such as the implementation of a moratorium on new wells, certified acres, allocations, etc. Additionally, voluntary reductions in baseline pumping volumes will continue to be pursued by the District with the incentive of limiting the level of long-term Management actions that are necessary during Compact Call years. We feel that this is a great voluntary project that can help the District as well as the producers all become better managers for conserving and preserving the great natural resource water so that

we will be able to enjoy it for generations to come. Through our IMP we also have committed to reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use, this voluntary project is for producers to take their water Management to a higher level, but this is all to the extent funds are available. So by applying for the water Sustainability Funding, our District can get as many of these systems out into the fields. Providing this additional tool to the MRNRD producers could lead up to a 2 inch saving per year that will not only help meet the pumping standard within our IMP but also address aquifer depletions and surface flows.

Section D.

PROJECT DESCRIPTION

1. Overview

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

The MRNRD's project of Aquifer Sustainability will offer real-time data that provides growers with the information needed to make quick, effective management decisions. The benefits of these systems for our producers will avoid over or under watering, set alarms for critical events, make timely decisions about power, fertilizer, chemicals, and more. The project will help producers reduce their costs while improving their yields and reducing water usage. The MRNRD feels that by implementing these wireless irrigation systems we are allowing our producers to properly use the precious natural resource of water in a more efficient manner. We also feel that our producers have been given by the restrictions and implications that they are preserving the water resource by abiding their allocations and then ensuring that they are protecting the water from over use. This helps the District achieve our goal that efficiency is a core element of a sustainable water source.

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.

This High Tech Irrigation project will install 50 High Tech Systems within the District over three years. The producers will pay an annual maintenance and transmission fee. The MRNRD will employ a summer intern that will provide follow-up assistance, working through any problems or concerns with the system. The project will provide three years of support after installation with the expectation of adoption of this level of irrigation management at that time. The MRNRD will have access to all the information and the Board will use that information in making allocation and management decisions.

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.

Partnerships will be determined by the producers that sign up. The MRNRD and Natural Resources Commission through the Water Sustainability Fund will be partnering with individual irrigators implementing this project. The producers will be responsible for using the data available in managing their irrigation, the MRNRD role will be to offer assistance to producers in successfully installing and troubleshooting any concerns. The WSF role is to help with the upfront cost of the system.

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.

The entire project budget is \$500,000, with \$250,000 requested from the WSF, \$250,000 budgeted in the MRNRD budget. The MRNRD has personnel budgeted and will include those costs and matching costs with producers over the three years of the project not included in the funding request. If WSF funds are not obtained the MRNRD will roll out a very scaled down version with a very small impact.

5. Support/Opposition

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

There has been tremendous support as is apparent with the letters of support. To mention a few, Dan Hughes, State Senator strongly supports the project as does Craig Derickson, the NE NRCS State Conservationist. One neighboring NRD (Lower Republican) supports this project as well as the local UNL-NCTA school. The MRNRD has support from the NEWBA, three different companies that supply this type or technology and local farmers. Also the Nebraska Extension Educator located in North Platte has shown strong interest as well as the local Seed Companies. There has not been one instance where we found any opposition.