NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Burr-Cook Paleovalley Aquifer Sub-Area Resiliency Project

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

Sponsor Business Name: Nemaha Natural Resources District

Sponsor Contact's Name: Chuck Wingert

Sponsor Contact's Address: 62161 US Highway 136 Tecumseh, NE 68450

Sponsor Contact's Phone: 402-335-3325

Sponsor Contact's Email: cwingert@nemahanrd.org

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

   Grant amount requested. $ 36,000

   - If requesting less than 60% cost-share, what %? NA

   If a loan is requested amount requested. $ NA

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

2. **Neb. Rev. Stat. § 2-1507 (2)**

   Are you applying for a **combined sewer overflow project**? YES☐ NO☒

   If yes:

   - Do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality? YES☐ NO☐

- Attach a copy to your application. Click here to enter text.
- What is the population served by your project? Click here to enter text.
- Provide a demonstration of need. Click here to enter text.
- **Do not complete the remainder of the application.**

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

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

G&P - T&E consultation (required)	N/A☒	Obtained: YES☐	NO☐
DNR Surface Water Right	N/A☒	Obtained: YES☐	NO☐
USACE (e.g., 404/other Permit)	N/A☒	Obtained: YES☐	NO☐
FEMA (CLOMR)	N/A☒	Obtained: YES☐	NO☐
Local Zoning/Construction	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.

4. **Partnerships**

List each Partner / Co-sponsor, attach documentation of agreement:
Otoe County Rural Water District #3 (RWD) is a financial sponsor, pledging $12,000 over the proposed two years of the project. The Natural Resource Conservation Service is a technical sponsor through the Nemaha Natural Resource Districts' interlocal agreement. They will be providing technical review and expanded irrigation efficiency cost-share opportunities to producers through their Environmental Quality Incentives Program (EQIP).

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

Otoe County Rural Water District #3 (RWD) will provide $12,000 over two years as local match for this project. Additionally, RWD will help with this project by providing water saving tips to their water users. RWD is also financially involved with the parallel Nebraska Environmental Trust grant (24-104, Burr-Cook Paleovalley Sub-Area Resiliency Project) the Nemaha NRD received in 2024. Natural Resource Conservation Service (NRCS) will provide technical assistance for this project by running proposed nozzle packages through their engineering program to ensure that runoff does not exceed 1% and at a minimum, their standards and specifications for nozzle efficiency are met. In addition, they will provide technical assistance to producers wishing to take their irrigation efficiencies to the next level through the Environmental Quality Incentives Program (EQIP). The NRCS is not a funding source.

5. **Other Sources of Funding**

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

The entire project will cost $60,000 over two years. The Nemaha Natural Resources District (NNRD) will provide $6,000 from its FY25 budget and $6,000 from its FY26 budget as the local match. Otoe County Rural Water District #3 will contribute $12,000 over two years toward the project. The remaining $36,000 of the funds (60%) will come from the Water Sustainability Fund. The NNRD has another parallel project in place with the Nebraska Environmental Trust. The funds designated for this proposed project have been budgeted entirely separate.

6. **Overview**

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

Due to its confined nature, the Burr-Cook Paleovalley Aquifer (Aquifer) experiences seasonal decreases in water levels that correlate with peak water use and rebound in the off season. During a sustained drought in June of 2023 water levels reached a level they typically don't reach until mid-August, putting only 9 feet of head above one of Otoe County Rural Water District #3's (RWD) municipal wells and threatening the water supply for its 6,687 users. Collectively, there are 13 municipal water wells within the Aquifer that service over 9,000 people in Johnson, Otoe, and Cass Counties. As a result, the concept of this pilot project was developed to mitigate for future drought years and expanding domestic water users. The objective of this project is to achieve water savings and promote water quality through voluntary irrigation efficiency improvements on existing center pivot irrigation systems leading to the long-term sustainability of the Aquifer for all beneficial uses.

Center pivot irrigation efficiencies that lead to water savings proposed by this project are realized as unnecessary losses to the environment from less efficient nozzles are eliminated. When you look into a center pivot irrigated field you can often see the system running because of the fine mist created as water leaves the system. This pressurized, fine particle sized water is highly susceptible to environmental losses through drift and evaporation. In certain instances of high temperature, low relative humidity conditions the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has measured these losses as high as 45%. Uniformity of application also directly correlates to irrigation efficiencies. Water applied to a crop field unevenly is more likely to pond, deep percolate, or create runoff. Environmental losses of this nature are more problematic to water quality as nutrients and chemicals move out of the root zone and into groundwater sources or off the agricultural fields into nearby surface waters. Uneven application also drives producers to put more water than necessary on the entire field to account for areas that receive less than desirable amounts of irrigation water. The nozzles proposed through this project mimic a gentle rain by increasing droplet diameter and reducing operating pressure (reducing drift/evaporation) and ensuring uniformity of application across the field (reduced ponding, deep percolation, and runoff).

Cost-share will be provided to upgrade existing center pivot sprinkler packages to the latest, most efficient, low-pressure technology and, if needed, a flowmeter. These nozzles will be certified by NRCS prior to approval, ensuring they meet NRCS efficiency standards and specifications at a minimum and produce less than 1% runoff under the current conservation management system, soil types, and topography. To participate in the project a flowmeter and two years of water use reporting will be required. Flowmeter data, in addition to a series of groundwater observation wells will be evaluated to determine the successfulness of the project. Additional outcomes from the project are improved air quality through reduced energy use and particulate matter emissions. By maintaining higher water levels less energy is required to pump water for beneficial uses.

This project helps the NNRD to meet goals and objectives as outlined in their Voluntary Integrated Management Plan and protects sources of groundwater and surface water so economic viability, social and environmental health, safety, and welfare can be achieved and maintained in both the near and long-term. Implementing water efficient irrigation nozzles within the pilot project area has the potential to take off district wide and impact the volume of water needed to achieve crop production goals. The NNRD's 2023 average irrigation amount applied was 3.68 inches per acre over 24,401 acres. If just half of those acres were able to save half an inch of irrigation water per year that would amount to over 165 million gallons of groundwater saved.

7. **Project Tasks and Timeline**

Identify what activities will be conducted to complete the project, and the anticipated completion date.

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

Tasks	Year 1$	Year 2$	Year 3$	Remaining	Total $ Amt.
Permits	$18,000				$18,000
Engineering		$96,000			$96,000
Construction		$87,000	$96,000		$183,000

Close-out	$8,000	$8,000
	TOTAL	$305,000

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

This multi-year project will provide cost-share to irrigated agricultural producers to make voluntary efficiency improvements to their existing center pivot systems by replacing existing nozzles with the latest, most efficient nozzles. To participate in the program a flowmeter is required. An application period will open following the award of funding. Interested irrigated producers within the project's boundaries will go to their county's USDA service center's NRCS office or to the NNRD to complete an application. Approved applicants will work with an irrigation supplier to prepare a nozzle package that meets the specifications of the cost-share program. That proposed package would be reviewed by NRCS to ensure it meets program requirements. NRCS would additionally look at the current conservation management system in place, soils, topography of the irrigated field, and the proposed nozzle package to ensure no more than 1% runoff would occur following installation (1% is a NRCS standard). If all program specifications are met the applicant will order their nozzle package (and flowmeter if necessary) and will be responsible for the installation, maintenance, and replacement of nozzles. The NNRD will complete a final inspection to ensure the approved nozzles and required flowmeter have been installed. Participants will be required to keep track of irrigation water use and report back to the NNRD at the end of the growing season showing water savings in the area for two years (NNRD will collect readings after that). Through interactions with the NRCS, it is the hope that participants will utilize additional federal funding through EQIP to expand upon irrigation best management practices and/or make additional climate smart improvements to their existing system. The timeframe from application to implementation will vary depending on the workload of the irrigation supplier and NRCS offices, but not be greater than one crop year. Installation is not expected to take more than a day or two. Checkout will take a couple of hours. This process will be identical for both years of the project and we expect to spend approximately half of the funds ($30,000) per program year. It is estimated that nozzles would cost approximately $6,500 per pivot and a flowmeter would cost approximately $1,500 each (allowing for approximately 4 system conversions per year).

Funding Source	FY25 (July 1, 2024-June 30, 2025)	FY26 (July 1, 2025 – June 30, 2026)	Total
Nemaha NRD (20%)	$6,000	$6,000	$12,000
RWD#3 (20%)	$6,000	$6,000	$12,000
WSF Reimbursement (60%)	$18,000	$18,000	$36,000
Total Project Cost	$30,000	$30,000	$60,000

8. **IMP**

Do you have an **Integrated Management Plan** in place, or have you initiated one?

YES☒ NO☐ Sponsor is not an NRD☐

Section B.

DNR DIRECTOR'S FINDINGS

Prove Engineering & Technical Feasibility
(Applicant must demonstrate compliance with Title 261, CH 2 - 004)

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

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

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

1.A.1 Insert a feasibility report to comply with Title 261, Chapter 2, including engineering and technical data; Click here to enter text.

1.A.2 Describe the plan of development (004.01 A); Click here to enter text.

1.A.3 Include a description of all field investigations made to substantiate the feasibility report (004.01 B); Click here to enter text.

1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); Click here to enter text.

1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D); Click here to enter text.

1.A.6 Discuss each component of the final plan (004.01 E); Click here to enter text.

1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); Click here to enter text.

1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2); Click here to enter text.

1.A.9 When applicable include the criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). Click here to enter text.

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

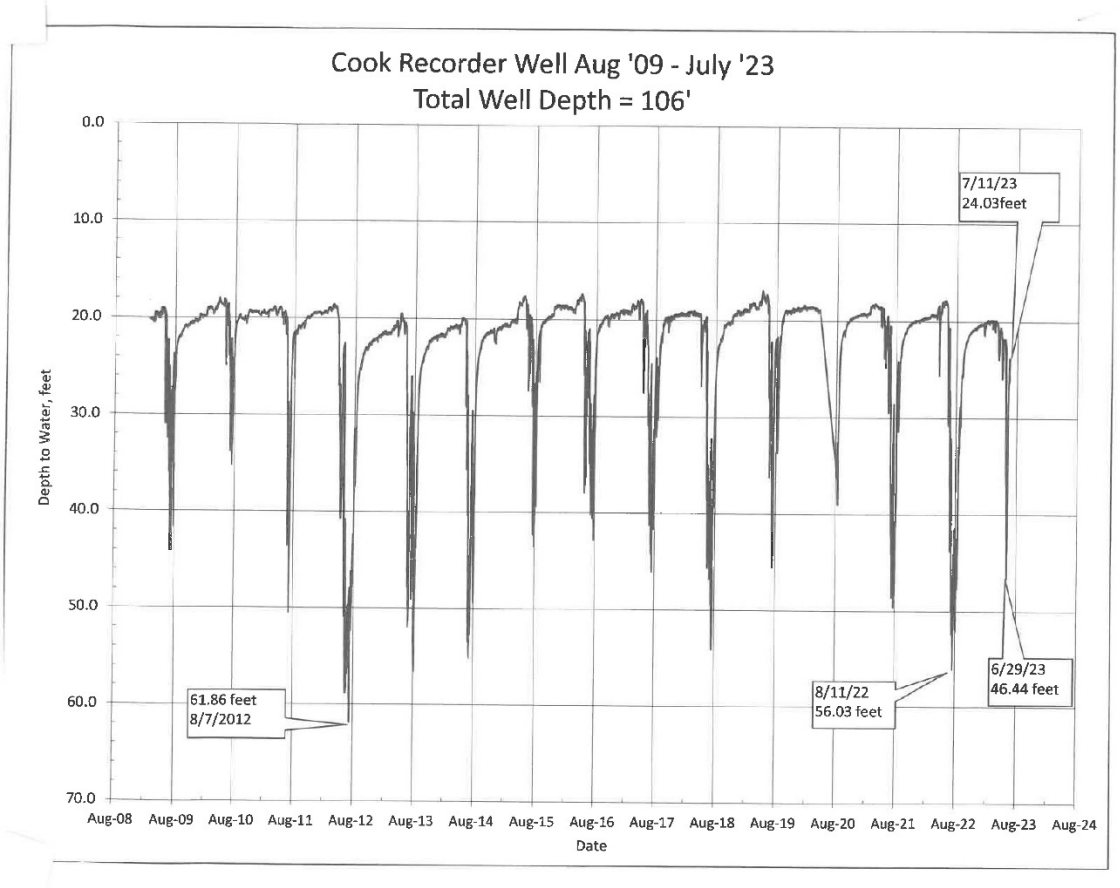
1.B.1 Insert data necessary to establish technical feasibility (004.02); Inefficiencies in center pivot irrigation systems result in excess water required to obtain crop production goals. Of note, drift, evapotranspiration, and uniformity are all critical factors to consider when trying to make the most of water resources. When looking

into a center pivot irrigated field you can often tell that the system is running because there is a mist around the pivot. What you are seeing is fine sized particles that are susceptible to evaporation and drift, often resulting in a less than desirable uniformity of application. In extreme conditions, the NRCS notes that water losses for irrigation systems with fine droplet sizes during high temperature, low relative humidity conditions, have been measured at up to 45%. New technology has emerged, allowing irrigators to opt for a low-pressure nozzle package on their existing center pivot that provides a uniform distribution and droplet size that mimics gentle rain. These advances have the potential to reduce the demand on the confined aquifers in southeast Nebraska during peak irrigation leading to long-term sustainable use for agricultural producers and rural/municipal water users alike.

1.B.2 Discuss the plan of development (004.02 A); This project was developed following a very dry spring in southeast Nebraska. Due to unseasonably high demand for irrigation water, Otoe County Rural Water District #3's municipal well was in grave danger of not having enough water to pump. Water levels at the well declined to a point they don't typically reach until late summer. The Burr-Cook Paleovalley Aquifer Sub-Area Resiliency Project was developed to improve irrigation efficiencies in a pilot area and reduce the overall pressure on the confined aquifer as multiple irrigation systems are kicked on at once. This project will provide voluntary cost-share for interested center-pivot irrigation users in the project's pilot area. Individuals will be notified that funding is available to help upgrade existing center pivot nozzle packages into the latest, most efficient nozzles on the market. If interested, participants will work with the NNRD, NRCS, and an irrigation dealer to develop a nozzle package that meets the minimum specifications of the program. The pivot dealer will prepare the nozzle package and cost components for the producer, also generating a Center Pivot Evaluation and Design (CPED) report that indicates the coefficient of uniformity for the system. NRCS will evaluate the current management practices of the existing farm operation, determine the expected infiltration rate of the soils under the existing management system, and pair that with the proposed sprinkler package to ensure that no more than 1% of irrigation water becomes runoff (this is the NRCS standard & specification for designing irrigation systems). Producers will additionally have the option to work with NRCS to apply to implement other irrigation efficiency and/or climate smart improvements on their farm operation through EQIP.

1.B.3 Describe field or research investigations utilized to substantiate the project conception (004.02 B); Typical seasonal fluctuations in the water table of the Burr-Cook Paleovalley Aquifer occur each year (see graph below). Due to the nature of the confined aquifer, water levels decrease throughout the irrigation season during peak demand and rebound in the off-season. Through an increase in irrigation efficiencies, this project will reduce the overall amount of water used by center pivot irrigators that decide to participate. This reduction in water pumped during peak irrigation season will promote the long-term sustainability of the aquifer for all beneficial water users. If you have ever driven past a center pivot while it is running you will likely recall seeing a mist around it. This mist is created as pressurized water droplets are forced through nozzles. These fine particles are most susceptible to drift and evaporation, requiring more groundwater to be pumped in order to meet

crop production goals. NRCS notes that in certain extreme instances, water losses from drift and evaporation can reach as high as 45%. By mimicking gentle rain the highly efficient irrigation nozzles proposed through this project will increase droplet diameter and reduce water losses to the environment from drift and evaporation. The proposed nozzles additionally create a uniform water droplet size and distribute irrigation water evenly across the wetted area. Through uniform droplet sizes, irrigation water is delivered more uniformly to the field resulting is less loss from ponding/deep percolation and runoff. For a center pivot to meet NRCS standards and specifications it must be a minimum of 85% efficient and produce 1% or less runoff under the management practices implemented by the farm operation. This project will require a Uniformity Coefficient of 96% or greater and also ensure 1% of less runoff from the proposed system.



1.B.4 Describe any necessary water and/or land rights (004.02 C); NA

1.B.5 Discuss the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D). There are 34 irrigation wells and 13 municipal drinking water wells in the project area. This project protects the current infrastructure by promoting irrigation efficiencies that will reduce the volume of water being pulled from the aquifer at any given time and ensure that a greater percentage of groundwater used for irrigation goes directly to its intended purpose. Producers utilizing high efficiency nozzles have noticed changes in their irrigated

fields following conversion. Since more groundwater is reaching and retained by the soil, less overall water is needed for each pass of the pivot. By increasing efficiencies, producers are having to either decrease the gallons per minute they are pumping or speed their pivot up. Another added benefit of reducing the overall consumptive use by irrigation is reduced wear and tear on existing infrastructure. By maintaining more head above existing groundwater pumps, less energy is required to pump water for beneficial use. This reduced cost of wear and tear on equipment benefits both agricultural users and municipal water users financially. By promoting the long-term sustainability of the Burr-Cook Paleovalley Sub-Area Aquifer, this project seeks to prevent the need for additional municipal water wells to service existing users.

Prove Economic Feasibility

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

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative. Alternatives to re-nozzling while creating more efficient irrigation water delivery include Subsurface Drip Irrigation (SDI) and installing nozzle drops. From an economic standpoint, SDI costs approximately $600/acre more than a center pivot would and does not tend to last as long (K-State, 2018). This project focuses on making improvements to irrigation systems already in place and would cost about $52/acre to complete in comparison to $1,331/acre cost of installing a SDI system. The other alternative that would result in net water savings would be the installation of drops on the existing nozzles. This practice is widely used in other areas of the state to reduce drift and evaporation by placing nozzles within, or close to, the crop canopy. Due to the hilly terrain of southeast Nebraska these nozzles are not as desirable because they can not achieve a uniform distribution. The NRCS estimates the cost of drops to be $55.88 per nozzle. Re-nozzling through this cost-share program is estimated to be approximately $30/nozzle. In addition to the financial considerations associated with irrigation systems, it should be noted that producers targeted by this project already have center pivot irrigation infrastructure in place. The chance of them replacing infrastructure with something that will cost substantially more is rather low. Replacing nozzles on existing pivot infrastructure is the most acceptable option and allows the smallest amount of funds to make the largest impact to groundwater sustainability.

3. Document all sources and report all **costs** and **benefit data** using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies is the project life. (Title 261, CH 2 - 005). The proposed project sets aside $60,000 for cost-share of new, highly efficient, center pivot irrigation nozzles and flowmeters. It is estimated that one nozzle package will cost approximately $6,500 and flowmeter will cost approximately $1,500. Generally speaking, this would account for 8 system conversions or 1,000 irrigated acres

(approximately 29% of all irrigated acres within the project area). If each producer can reduce the total volume of groundwater used by half an inch, that would result in 46 million gallons of water saved per year because of this project. Benefits of this water savings are difficult to quantify. Irrigated agricultural producers will be able to maintain or improve their current yields. Improvements are possible by unifying the distribution across all acres. Uniform water application across the entire field will eliminate ponding and runoff that causes water related stress that can decrease yields. Decreased volume of irrigation water needed will additionally reduce operation costs and increase profitability for agricultural producers. Avoiding the need to install any additional municipal water wells is the greatest benefit to municipal and rural water users. A new municipal well is estimated to cost $500,000 and any additional storage (water tower) could cost upward of a million dollars. By protecting the existing infrastructure and long-term sustainability of the project municipal and rural water users can maintain current water costs.

3.A Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01). Engineering and inspection costs will be handled through the NNRD,NRCS, and the pivot dealer. The pivot dealer will put together a proposed nozzle package that meets the project's specification, including CPED Report. This package will be reviewed by NRCS to ensure it meets project specifications and additionally verify that under the current management practices 1% or less runoff will occur after the nozzles are in place. The review by NRCS is financially covered through the NNRD & NRCS' Interlocal Agreement. The NNRD will inspect the final nozzle package utilizing their existing staff and budget to ensure that what was installed is what was approved by NRCS. All installation, operation, and maintenance costs will be covered by the program applicant as a requirement of the project. The cost directly associated with this project is estimated to be $6,500 per system (based on a ¼ mile long pivot (replacement cost would be the same). If the irrigation system in place does not have a flowmeter, one will be required to receive cost-share. A flowmeter is a best management practice that has been required by the NNRD on all new high capacity wells since 2013. It is estimated that $750 of Water Sustainability project funds will be put toward the purchase of a flowmeter. The NNRD has a flowmeter cost-share program available to cover additional costs up to $1500 total between both funding sources. The construction period, once cost-share is approved, should not be longer than a couple of days per system. The expected project life is based on the industry standard of ten years or ten thousand hours. All expended costs from this project will go directly toward producer cost-share.

3.B Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe intangible or secondary benefits (if any) separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, in a way that justifies economic feasibility of the project such that the finding can be approved by the Director and

the Commission (005.02). The variability of existing irrigation systems and their components (wells, pumping plants, nozzles, etc.) makes generally quantifying the tangible benefits of installing a new nozzle package difficult to do. Implementing voluntary sustainable management practices on high volume water users within the project study area will have the greatest overall impact to the aquifer. In 2023 the average amount of groundwater pumped across the entire NNRD was 3.68 inches. Quantitatively, this amounts to an estimated 343 million gallons of water pumped from the project area in the 2023 growing season. If each of the pivots were able to save just half an inch of irrigation water per year that would amount to 46 million gallons in water savings in one year alone. It is in the interest of all beneficial water users to implement best management practices that lead to the long term protection of the aquifer. From an agricultural perspective, substantial reductions in yield can occur when crops like corn do not have enough water to meet evaporation demands during peak water use in the reproductive stages. In a year without timely rains, the ability to irrigate crops when they need it allows producers to maintain productive crop yields that help feed the planet and contribute to America's national security. From a municipal perspective, for a rural water supplier or community such as Syracuse to install a new municipal well the estimated cost would be around $500,000 per well. Alternatives to installing a new municipal water well would include expanding water storage capacity which is estimated to cost over a million dollars and is only applicable if the existing water infrastructure is still functional. In addition to protecting existing infrastructure, highly uniform irrigation nozzles ensure the proper placement and rate of nutrients and chemicals when producers utilize chemigation. This project ensures that sprinklers are designed to operate within their optimal flow and pressure levels. Sprinklers that operate outside their design pressure parameters have uneven distribution patterns, throws, and droplet sizes which lead to irregular water distribution and uneven application of nutrients and chemicals, especially when chemigating. Uneven application results in too much nutrients/chemicals being applied in areas of the field while too little applied in others. This variability can lead to leaching beyond the crop root zone and nutrients/chemicals making their way to the groundwater. Groundwater treatment methods to remove contaminants like nitrogen can cost municipal water suppliers astronomical amounts of money or lead them to drill additional wells to blend water to meet safe drinking water standards.

3.C Present all cost and benefit data in a table to indicate the annual cash flow for the life of the project (005.03). The information is as follows;

Year	Project Component	Cost	Benefit
2024 (NNRD FY25)	Irrigation System Improvements – Nozzle Packages, Flowmeters	Estimated $6,500 per nozzle package, $1,500 per flowmeter. 20-40% of systems receive new nozzles. Annual cash flow of $30,000 toward cost-share	Potential to avoid drilling new municipal domestic well: $500,000 each. Additional storage facility: upwards of $1 million each. Remediation costs for degraded water quality are extremely high.
2025 (NNRD FY26)	Irrigation System Improvements – Nozzle Packages, Flowmeters	Estimated $6,500 per nozzle package, $1,500 per flowmeter. 20-40% of systems receive new nozzles. Annual cash flow of $30,000 toward cost-share	
Total		Cumulatively through this project $60,000 toward cost-share. Additional $60,000 in cost-share from the parallel Nebraska Environmental Trust project (NOTE, all project funds are entirely separate).	>$1,000,000

3.D In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.) Putting a dollar amount on the primary tangible benefits of safe, affordable, and reliable drinking water is impossible to do. There are so many variables that go into the calculation of what water is worth. In the case of the irrigated southeastern Nebraska agricultural producer, the tangible benefit is tied to crop yield and overall profitability. When crops don't receive enough water during reproductive growth stages yields can suffer significantly. In southeast Nebraska annual rainfall is typically enough to make irrigation more of a drought mitigation tool or means to push crops to their maximum production levels. Depending on the year, irrigation could be the difference in producing a great crop and having to claim crop insurance. Another tangible benefit of this project specifically for agricultural producers is the ability to manage irrigation water applications more precisely through a flowmeter. Understanding the rate at which water is pumped from the ground and the total volume applied helps producers to make agronomically sound economic decisions about when to water and how that water is impacting profitability of the operation. Producers live within and raise their families in the communities surrounding their fields and have a vested interest in conserving water quantity and quality for future generations. Tangible benefits for the residents, businesses, and industries utilizing

groundwater from the project area are tied directly to water availability and quality. Without safe, reliable, and affordable drinking water residents would be unable to build their lives within the service area of the municipal water wells and economic development would be greatly reduced or eliminated. This project is economically feasible because it maximizes funding to do the most good with the least amount of money. By making efficiency improvements on existing center pivot irrigation infrastructure the cost to conserve groundwater is greatly reduced. When compared to installing Subsurface Drip Irrigation (SDI), this project costs $55/acre rather than $1,331/acre. Should water quantity or quality become an issue for municipal water supplies the alternative would be to install a new well or water storage facility. It is estimated that the cost to install a new municipal water well would be around $500,000 and a new water tower would be over $1,000,000. This project is backed by funding partners as the best option to proactively protect water resources within the project area and supported technically through the US Department of Agriculture NRCS.

Prove Financial Feasibility

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

4. Provide evidence that sufficient funds are available to complete the proposal. NRDs have the authority to impose property tax levies to generate revenue for operational needs. The current funding levee for Fiscal Year 2024, which runs July 1, 2023 through June 30, 2024 is 0.029996 per $100 valuation in property. The total FY24 budget based on property tax valuations is $3,961,645. The Board of Directors has pledged $6,000 for both FY25 and FY26. These budgets begin July 1 and have historically been approved at the September board meeting.

5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace). The total FY24 budget for the Nemaha Natural Resources District (NNRD) is $3,961,645. Operation, maintenance, and replacement costs will be covered by project applicants. The FY25and FY26 budgets will have a line item reflecting the NNRD's $6,000 annual contribution to 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. NA

7. Describe how the plan of development minimizes impacts on the natural environment (i.e. timing vs nesting/migration, etc.). This project will provide cost-share on existing center pivots on farmland currently in annual row-crop production. There will be no physical construction or ground disturbing activities associated with it beyond those normal to the existing cropping conservation system. Impacts to the natural environment are not anticipated as a result of this project.

8. Explain how you are qualified, responsible and legally capable of carrying out the project for which you are seeking funds. To carry out the technical components of this project, the NNRD has partnered with the US Department of Agriculture

(USDA) NRCS through their interlocal agreement. Engineers at NRCS will have final review on all proposed nozzle packages developed by irrigation equipment dealers to ensure they meet project specifications and additionally to ensure there is no greater than 1% runoff when the irrigation system is running with the new nozzles under existing land management practices. The State of Nebraska legislature has found that Nebraska's Natural Resources Districts (NRDs) have significant legal authority to regulate activities that contribute to declines in groundwater levels and are the preferred entities to regulate groundwater related activities. The NNRD additionally has the authority under Nebraska Revised State Statute Chapter 46 Article 7: Groundwater Management Protection Act to carry out projects related to the development, management, utilization, and conservation of ground and surface water. The NNRD strives to manage groundwater resources and its sustainability across the district and has developed resources to do so, including a Voluntary Integrated Management Plan (VIMP). This cost-share program is in alignment with and contributes to the goals of the NNRD's VIMP.

9. Explain how your project considers plans and programs of the state and resources development plans of the political subdivisions of the state. As noted in Nebraska's Groundwater Management Protection Act (Act), "groundwater is one of the most valuable natural resources in the state, and adequate supply of groundwater is essential to the general welfare of the citizens of this state and to the present and future development of agriculture in this state." This project is in alignment with intent of the Act and the VIMP developed between the Nemaha Natural Resources District (NNRD) and the Nebraska Department of Natural Resources (NDNR). It meets several goals outlined in the plan and has the potential to be replicated across the NNRD and potentially the state, leading to the quantitative conservation of water resources for all beneficial users. From a more local perspective the most recent (2020) multi-jurisdictional Hazard Mitigation Plan indicates a concern for drought and extreme heat from multiple jurisdictions serviced by the pilot project. Communities have in place or were developing water conservation measures and drought plans of action to mitigate risks to their drinking water resources. This project serves as an additional mitigation measure taken to protect the sustainability of consumptive water users of the study area's aquifer.

10. Are land rights necessary to complete your project? YES☐ NO☒

If yes:

10.A Provide a complete listing of all lands involved in the project. Click here to enter text.

10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held. Click here to enter text.

10.C 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 NNRD has the authority to undertake this project because the purpose of the project relates directly to the development, management, utilization, and conservation of groundwater resources as designated in Nebraska State Statute Chapter 2, Article 32. The NNRD is additionally able to enter into contracts/agreements, budget and expend levied property taxes, own and operate property and equipment, and conduct investigations relative to the protection and management of groundwater.

12. Identify the probable consequences (environmental and ecological) that may result if the project is or is not completed. If this project is not implemented the total impact of efforts by the NNRD and its partners might not be fully realized. A parallel Nebraska Environmental Trust grant has been awarded to the NNRD that will begin April 1, 2024. Having funding through the Water Sustainability Fund would allow additional irrigators to participate in the voluntary irrigation efficiencies project resulting in more groundwater conserved across more irrigated acres within the project study area. The consequences of this project not happening would be decreased groundwater use efficiency, increased or sustained evaporation and drift, and less than optimal uniformity. In addition to conserving groundwater quantity for the ecosystems that utilize it, the missed opportunity to improve upon existing infrastructure could have adverse environmental and ecological effects to water quality. Without uniformity of application, ponding and runoff are more likely to occur. As runoff leaves the field, soil particles with attached nutrients and chemicals also leave the field and make their way to surface water resources, potentially degrading water quality. When water is applied unevenly to a field, ponding can cause water soluble nutrients and chemicals to leach beyond the crop rooting zone and eventually enter the groundwater. This impact is compounded when chemigation occurs because excess chemicals and nutrients are applied to certain areas of the field and not to others. Contamination of water sources is a very serious ecological concern with long lasting effects.

Section C.

NRC SCORING

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

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

Notes:

- The responses to one criterion ***will not*** be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.

- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted above. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.

- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

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

1. Remediates or mitigates threats to drinking water;

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

The goal of this project is to protect beneficial users of the Burr-Cook Paleovalley Aquifer where the City of Syracuse, Otoe County Rural Water District #3 (RWD) (covering 750 square miles including Douglas, Palmyra, Unadilla, Otoe, Avoca, Manley, Cedar Creek, and Platte River State Park), and the villages of Burr and Cook. Collectively there are 1,960 citizens of Syracuse and 6,687 users in the RWD. The villages of Burr and Cook have a total population of 357 people. Both Cass and Otoe Counties have grown at a rate

of 2% and 1.8% respectively, between April 2020 and July 2022 (US Census). It is anticipated that commercial and residential development will continue to expand and the demand for safe, reliable drinking water will increase. The Nemaha NRD actively monitors groundwater levels within the Burr-Cook Paleovalley Aquifer at 8 observation wells (measured 2 times per year) and at 3 designated recorder wells (hourly readings) with the goal of installing one additional recorder well in 2024. Annual fluctuations in groundwater levels are expected due to the nature of the confined aquifer. However, in June of 2023 groundwater levels declined to a point they don't usually reach until mid-August because of increased irrigation demand, and less than normal precipitation from the drought. One of the RWD's groundwater well levels reached a critical point, having only 9 feet of head above the pump. Fortunately, timely rains provided a much-needed relief and allowed the aquifer to recover before irrigation was utilized again. Since May of 2013 the Nemaha NRD has required flowmeters on all new high-capacity wells (capable of pumping over 50 gallons per minute or more). The irrigation wells in the pilot project are primarily over 20 years old with only three having flowmeters. Advances in irrigation technology have created new efficiencies that will reduce the amount of irrigation water lost to the environment through drift, evaporation, deep percolation, ponding, and/or runoff. This project seeks to provide voluntary cost-share to existing center pivot irrigators in the pilot area to upgrade nozzles to the latest, most efficient technology available. These upgrades will reduce the amount of groundwater required to irrigate and therefore reduce irrigation pressure on the aquifer during peak demand, promoting long-term sustainability for domestic water users and irrigators alike.

2. Meets the goals and objectives of an approved integrated management plan or groundwater 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 Nemaha NRD's Voluntary Integrated Management Plan went into effect in May of 2022. This project's goals are identical to the ultimate goal of the VIMP within the project pilot area; to protect the existing investments and interests while facilitating economic growth and well-being across the district. This project additionally works toward preventing conflicts between users and planning for future uses. To date, the NNRD has worked toward and prioritized integrated groundwater management across the district. AEM has been utilized to better delineate the extents of aquifers within the NNRD and identify areas with interconnected ground and surface waters. Water supplies are monitored through a series of recorder wells that collect hourly groundwater readings and additionally twice a year through a groundwater level monitoring network. Long term data provides a framework of reference to better understand the characteristics of the NNRD's aquifers. New groundwater uses are evaluated using a weighted point system developed by the NNRD prior to approval. The ranking system is designed to protect the long-term beneficial use of groundwater within the NNRD. The NNRD additionally utilizes its website, social

media, and newsletter to expand the public's knowledge on the water resources within the district and how they are managed. This project supports action items 1.2.5 Monitor changes and trends in supplies and uses within the district, 3.1.2 Identify opportunities to coordinate with other agencies on outreach materials, 3.2.1 Develop specific outreach program for engaging and educating constituents, especially prioritized target groups, and 3.2.2 Identify and participate in public outreach efforts in support of outreach program. Action item 1.2.5 will be implemented through the requirement of flowmeters on all participants wells. There are currently only three high-capacity groundwater wells within the pilot area. Expanding the flowmeter network in the area will assist the NNRD in monitoring water use trends. It will additionally equip operators with critical information on water uses throughout the irrigation season. Action item 3.1.2 is accomplished through the development of a partnership with RWD and NRCS. RWD is a financial partner in this project and the parallel NET project. The NRCS serves as the technical expert on conservation work carried out in the NNRD. This project expands that partnership from structural best management practices through the soil and water conservation program to additionally promote irrigation efficiencies. NRCS will give the final approval for all proposed nozzle packages and provide verification that no more than 1% runoff will occur when the nozzle package is installed. Action item 3.2.1 and 3.2.2 are achieved through this project because a target area has been established in the pilot-project area. The NNRD and its partners will provide tailored information to landowners and operators with center pivot irrigation in the project area on making irrigation efficiency improvements. Installation of flowmeters will strengthen the long-term education component of this project. RWD will provide outreach and education on the importance of being water smart and the benefits of water conservation.

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

   List the following information that is applicable:

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

   This project seeks to reduce depletion by reducing the overall quantity of water pumped from the Burr-Cook Paleovalley Aquifer. This will occur through voluntary irrigation efficiency improvements in the project area that lead to an increased percentage of groundwater utilized by the growing crop. Irrigation water losses from drift and evaporation are unavoidable and, under certain circumstances, can reach as high as 45%. High and mid pressure irrigation systems with a small nozzle orifice produce fine droplet sizes that are easily carried away on a windy day or evaporated to the environment. This project will reduce losses to drift and evaporation by increasing water droplet diameter and reducing operating pressure

at the nozzle. Once new nozzles are in place it is difficult to look into the field and see that the system is running because that fine mist created by the old nozzles has been drastically reduced, if not eliminated. Uniformity of application is another measure that assesses how efficiently a pivot system is working. If sprinkler packages are not evenly distributing irrigation water across all acres, it can lead to ponding and runoff. Without even distribution the water applied is targeted to the lowest efficiency needs within the field and over irrigation occurs in other areas of the field. This project will ensure a uniform, minimum of <<<ENTER % HERE>>> irrigation efficiency as determined by the CPED report. The NRCS minimum standard and specification for irrigation systems is 85%. Additionally, the project will ensure that no more than 1% runoff occurs under the current farming practices (factoring in residue management, topography, and soil type.

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.

   This project provides benefits for agricultural use, municipal/industrial use, conservation of water resources, and preservation of water quality for municipal use, wildlife, and recreation. The benefits are achieved through irrigation efficiency and management improvements on existing center pivot irrigation systems within a project area that lead to water quantity savings and promote improved water quality. Quantitatively, groundwater resources will be saved through this project by reducing unnecessary environmental losses associated with center pivot irrigation. Improvements to irrigation nozzles allow operators to use less pressure when irrigating, increase water droplet diameter, and improve uniformity of application. As a result, less water is lost to the environment through evaporation, drift, ponding, deep percolation, and runoff. Through irrigation efficiency improvements, less groundwater is needed to achieve or improve crop production goals. A decrease in the total volume of water used for irrigation correlates to higher water tables within the Burr-Cook Paleovalley confined aquifer and improved recovery time following peak uses. Increased head above pumps reduces wear and tear of pumping equipment and provides energy savings to water users. Domestic and industrial users benefit by protecting water quantity by avoiding having to expand infrastructure like additional wells or storage facilities that can be very costly and inhibit economic development. Qualitatively, this project protects recreational, and wildlife use by reducing irrigation runoff to a maximum of 1% (a USDA NRCS Standard) and improving uniformity of water application across the entire field. Sediment, agricultural chemicals, and nutrients that enter surface water as a result of runoff lead to recreational and aquatic life impairments. Within the project area, the western portion of the South Fork Little Nemaha River has been designated as

impaired for aquatic life (May through June) by atrazine, an agricultural chemical. Groundwater quality is protected for all beneficial uses by making uniformity improvements that lead to reduced ponding and deep percolation. Ponding and deep percolation can push water soluble nutrients and chemicals out of the crop root zone and into groundwater and lead to quality degradation. Remediation of degraded groundwater is very costly and can include measures like drilling a new groundwater well to blend with to achieve safe drinking water standards. Current water users within the project area include 34 irrigated agricultural producers and over 9,000 domestic water users (Otoe County Rural Water District #3, City of Syracuse, Village of Cook, and Village of Burr) within 760 square miles of Johnson, Otoe, and Cass Counties. Population growth in Otoe and Cass Counties has been 1.8% and 2% respectively and is expected to continue to grow due to close proximity to Lincoln and Omaha. Adequate drinking water is essential to the economic development of the project's service area. If water use continues on the current path, a future drought could temporarily shut down a municipal well or result in irrigated producers receiving cease and desist letters. This project serves as a mitigation measure and best management practice, protecting water resources for all users. It is the preferred action of the project sponsors and provides the most benefit per dollar spent. This project has the potential to be adopted throughout the NNRD and State, resulting in millions of gallons in water savings per year. Similarly to no-till in the 1980's, it takes a few innovators/early adopters that can really enhance adoption of conservation management practices by their peers.

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 Burr-Cook Paleovalley Aquifer is a confined aquifer that experiences seasonal fluctuations in the water table that correlate with the high demand periods of crop irrigation. Outside of the growing season the water table is able to recover to relatively predictable levels before the following growing season. This project provides cost-share to make voluntary irrigation efficiency improvements on existing center pivot irrigation systems that lead to water savings while maintaining or improving crop yields. Implementation of irrigation efficiencies in the project study area will allow more water to remain in the aquifer during peak irrigation season, reducing costs to operate groundwater pumps for agriculture, domestic, and municipal water users alike and mitigating the threat of drought into the future. The current service area of municipal and domestic water users in the pilot project area includes over 9,000 residents in portions of Cass County, Otoe County, and Johnson County, Nebraska. As populations continue to grow, especially in areas with close proximity to metropolitan areas, the need for safe, affordable, and reliable drinking water will only increase. The project encourages a balance of beneficial uses that leads to the continued economic development of the area and supports

the overall goal of NNRD Voluntary Integrated Management Plan (VIMP). This project promotes groundwater management by requiring a flowmeter to be eligible for cost-share. A flowmeter is a best management tool that allows irrigated producers to monitor the volume of water being pumped at any given time and keeps track of the total quantity of water pumped to irrigate. The information collected is utilized by the NNRD to document overall irrigation water use across the district each year. It also equips the producer with information to make more informed agronomic decisions throughout the growing season. This project promotes water quality for the citizens of Nebraska, particularly southeast Nebraska, by reducing environmental factors that lead to water quality degradation. An increased uniformity of irrigation water application leads to reduced ponding and deep percolation of nutrients and chemicals beyond the root zone, thus protecting groundwater quality. The project requires that less than 1% runoff occur following the installation of new nozzles under the current conservation management system, soil types, and terrain (USDA NRCS standard). Minimizing the volume of runoff keeps sediment and any attached nutrients/chemicals from leaving the field and entering nearby surface water.

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.

   This project will provide cost-share to voluntarily upgrade existing center pivot nozzles to the latest, most efficient, version. Interested participants will be required to work with the NNRD, NRCS, and an irrigation specialist to develop a nozzle package that meets program specifications. The producer will be responsible for all installation costs and operation and maintenance costs associated with the nozzles. The end result of the project will be increased irrigation efficiencies, and installation of a flowmeter if one isn't already in place, that leads to an overall water savings. Similar water savings can be achieved through SDI systems or conversion to drop nozzles. SDI systems cost approximately $600/acre more than center pivots, when installed new, and don't tend to last as long (K-State, 2018). Since the pilot project targets pivots that are already in place, the SDI conversion is estimated to be $1,331/acre vs the $52/acre estimated project cost. Nebraska's NRCS estimates the average cost of re-nozzling a pivot with drops to be $55.88 per nozzle compared to the project's highly efficient, low pressure nozzles that would cost approximately $30/nozzle. The only proposed project cost is cost-share for highly efficient irrigation nozzles.

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.

Chapter 46, Article 7 of Nebraska's Groundwater Management and Protection Act declares that "conservation of groundwater and the reasonable and beneficial use thereof are essential to the economic prosperity and future well-being of the state and that the public interest demands procedures for the implementation of management practices to conserve and protect groundwater supplies and prevent the contamination or inefficient or improper user thereof." This project seeks to protect groundwater supply through voluntary improvements in irrigation efficiencies leading to the long-term protection of groundwater uses for both municipal and agricultural benefit in the Burr-Cook Paleovalley Aquifer. This implementation of voluntary best management practices is in line with the legislature of the great state of Nebraska's vision as outlined in 46-702, "to extend groundwater reservoir life to the greatest extent practicable consistent with reasonable and beneficial use of the groundwater and best management practices." This project addresses objectives and action items from the NNRD's VIMP developed in partnership with the NDNR in accordance with the Nebraska Groundwater Management and Protection Act. The project addresses the ultimate goal of the NNRD's VIMP – to protect existing investments and interests while facilitating economic growth and well-being across the district.

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

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

This project aims to protect critical municipal drinking water wells and infrastructure serving the City of Syracuse, Otoe County Rural Water District #3 (RWD) which covers the Cities of Douglas, Palmyra, Unadilla, Otoe, Avoca, Manley, Cedar Creek, Platte River State Park, and Dunbar, and the Villages of Burr and Cook. The municipal drinking water infrastructure services over 9,000 people in Johnson, Otoe, and Cass counties. This project protects water quantity and quality by making irrigation efficiency improvements on existing center pivots that benefit public security, health, and safety. Through efficiency improvements there will be a reduction in the total volume of water necessary to irrigate crops that will result in

higher water levels and reduced recharge time within the Burr-Cook Paleovalley Aquifer. This project serves as a mitigation measure for future drought and promotes economic development of the service area by eliminating unnecessary environmental losses from inefficient irrigation systems. The current project area has approximately 3,400 irrigated acres. The average irrigation rate across the Nemaha Natural Resources District in 2023 was 3.68 inches over 24,401 irrigated acres, or over 2.4 billion gallons of water. Since there are only three flowmeters in the project area it is estimated that almost 343 million gallons of water were used in the project area in 2023. If each producer could reduce the total volume of water pumped for irrigating crops by only half an inch that would result in water savings of 331 million gallons district-wide or 46 million gallons within the project area. By maintaining more water in the aquifer, critical municipal drinking water and agricultural infrastructure is protected from failures associated with dry pumping, increased wear and tear associated with lower water levels and minimal head, and the need to expand infrastructure to produce the same volume of drinking water. To put a cost on these benefits is difficult. To replace a municipal well would be about $500,000. There are 13 within the project area whose total replacement cost would be upwards of $6.5 million. To expand storage infrastructure to mitigate less than desirable pumping levels would cost over $1 million per system. These costs impact drinking water consumers, as the costs are passed along to them through the providers. Safe, reliable drinking water is essential to a healthy life for all Nebraskans. This project additionally protects water quality for all water users by making efficiency improvements that decrease the likelihood of ponding and deep percolation of nutrients beyond the crop root zone and into the water table.

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.

A portion of the South Fork Little Nemaha River within the project area was listed as impaired for “Aquatic Life, May through June, Atrazine” on the most recent 303d listing. Through this project any proposed nozzle package will be reviewed by the USDA NRCS to ensure that no more than 1% runoff will occur with the new nozzle package under the current conservation system, soils, and topography. This benefits surface water quality, particularly in agricultural chemical impaired streams, by minimizing the irrigation water runoff and suspended soils, nutrients, or chemicals leaving the field and entering nearby surface waters. Recreation is also benefitted by reducing the amount of sediment entering waterbodies. The project promotes groundwater quality by improving the uniformity of water distribution across all irrigated acres. Uniform application prevents ponding and deep percolation from pushing nutrients and chemicals beyond the crop rooting zone,

down into groundwater. Protecting the quality of water for the 9,000 and counting water users in Johnson, Otoe, and Cass Counties is critical. Currently nitrate levels are below the Environmental Protection Agency's safe drinking water standard of 10 parts per million. Should fertilizer, like nitrogen, leach into the drinking water supply remediation would be extremely costly. In many instances municipal water suppliers will drill another well and attempt to blend water to reach safe standards. The estimated cost of installing a new municipal well is $500,000. These costs are passed along to water users and impact economic development and the overall health of the watershed.

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 NNRD is the local jurisdiction in support of this project. The NNRD's Fiscal Year (FY) 2024 taxing authority is 0.029996 per $100 valuation in property. The total FY24 budget based on property tax valuations is $3,961,645. Of that amount, $156,340 (and 2.5 staff positions) are designated to water quality and quantity programs. The proposed project sets aside $6,000 from the FY25 and $6,000 from the FY26 budgets as approved by the NNRD's board of directors on March 14, 2024. Otoe County Rural Water District #3 is a financial supporter of this project and has pledged $12,000 for the two year project from their budget. The NNRD Board of Directors have been very passionate about this project and have approved a parallel project through the Nebraska Environmental Trust, in addition to this proposed project.

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

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

The local jurisdiction is the NNRD and has the following plans in place that support sustainable water user: Groundwater Management Plan, Voluntary Integrated Management Plan (VIMP), 2023 Long-Range Plan, and Master Plan (2020-2030). To achieve the goals and objectives of these plans the NNRD maintains 2.5 full time

employees to carry out management, sampling, monitoring, and reporting efforts related to water quality and quantity. The NNRD has contributed to and received grant funding to expand its knowledge and water management capabilities of resources using Airborne Electromagnetic (AEM) flights. Flowmeters are required on all new or replacement high-capacity wells to allow the NNRD to better understand and monitor water use. Additionally, the NNRD utilizes a scoring system that evaluates nearby registered wells and actual geology of the proposed site (using a test hole documenting geologic materials and thicknesses) for all proposed high-capacity wells. Each of the NNRD's plans encourage maintaining a balance between water users and water supply that protects economic development and overall ecological health for the near and long term. This project supports sustainable water use within the project area for all beneficial uses by implementing voluntary irrigation efficiencies on existing center pivot irrigation systems that leads to water savings through reduced environmental losses. The USDA NRCS notes water losses from irrigation systems with fine droplet sizes during high temperature, low relative humidity conditions have been measured at up to 45%. Additional environmental losses of groundwater occur from runoff, ponding, and deep percolation because of non-uniform distribution and over irrigation. This project will minimize environmental losses by increasing irrigation efficiencies on existing center pivot systems through cost-share on new highly efficient nozzle technology. NRCS will evaluate the current cropping conservation system, soils, topography, and proposed nozzle package to ensure that no more than 1% runoff will occur after installation. Producers will report irrigation water use from their flowmeters at the end of each growing season for two years (NNRD will read all flowmeters annually after that) to assist in making water-smart management decisions that contribute to the profitability of their operations. Beneficial users of groundwater from the project area include owners/operators of the 34 irrigated agricultural fields and over 9,000 (and growing) municipal water users in over 760 square miles of Johnson, Otoe, and Cass Counties (including recreational users at the Nebraska Game and Park Commission's Platte River State Park). Stakeholders involved in, and beneficiaries of the project include the NNRD staff and board of directors, irrigated producers within the project area, the City of Syracuse, domestic water users within Otoe County Rural Water District #3's service area, the Villages of Burr and Cook.

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.

The state of Nebraska is committed to carefully monitoring and managing its finite water resources. Nebraska Department of Natural Resources and Nebraska's Natural Resources Districts have been tasked with collaboratively fulfilling the state's water goals. They are committed to protecting water both qualitatively and

quantitatively through various plans and initiatives. Maintaining a balance of water users while planning for economic development is a primary concern across Nebraska. This project will reduce environmental losses from drift, evaporation, deep percolation, and ponding and ensure that irrigation water pumped for agricultural purposes is fulfilling its intended purpose; producing crops to feed the growing population and protecting national security. This project benefits over 3,400 acres of irrigated cropland and over 9,000 municipal water users by promoting the long-term sustainability of their water source through irrigation efficiency improvements. Reducing environmental losses of groundwater will keep water levels elevated during peak demand and reduce energy costs associated with pumping water for all beneficial uses. This project protects Nebraska's groundwater from agricultural nutrients like nitrate by ensuring nozzles apply a uniform rate of water across the entire field, reducing ponding and deep percolation that drive nutrients out of the crop rooting zone and into groundwater sources. This project aligns with conservation practices promoted by the USDA NRCS on both state and national levels. NRCS is serving as the technical expert in this project and will verify that all irrigation components funded through this project meet, at a minimum, their standards and specifications. This project protects surface water quality for aquatic life and recreation by minimizing runoff from irrigated fields to 1% or less. Minimized runoff contributes to water quality by keeping sediment and attached nutrients/chemicals from leaving the field and entering nearby surface waters. This is of particular concern in the western portion of the South Fork Little Nemaha River that is listed as impaired for aquatic life by atrazine on the Environmental Protection Agency's 303d list. To expand upon the benefits of this project, NRCS will hold conversations with producers on irrigation efficiencies like Irrigation Water Management, and making improvements or replacing existing wells and pumping plants that are not optimally efficient to encourage participation in EQIP. As a pilot project, there is great potential for this project to serve as both a catalyst and template in future water savings programs. The hope is that this project will have strong producer support and allow it to be expanded to include all irrigated producers within the Nemaha Natural Resources District. On a larger scale, additional grant funding coming through various federal agencies having similar water savings goals would be utilized if possible. Other NRDs could utilize the concepts developed and funded through this project to promote water quantity savings within their districts.

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

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

The Nemaha Natural Resources District (NNRD) has partnered with Otoe County Rural Water District #3 (RWD). Both the NNRD and RWD have pledged $6,000 for each Fiscal Year 2025 and 2026 (fiscal years run July 1 through June 30), totaling $24,000 for this project. The NRD's match will come from its taxing authority and will be reflected in the upcoming budgets. The Board has been so passionate about this concept that a separate parallel project has been developed and approved through the Nebraska Environmental Trust. In addition to financial contribution, RWD will provide water savings tips to its users. The NNRD will continue to promote water sustainability through its newsletter, website, and social media accounts. If Water Sustainability Funding for this project does not come through the impact won't be realized as quickly as it would have with this additional funding. Ideally this project will inspire conservation related conversations among agricultural producers in the area and beyond. When irrigators can have meaningful conversations on achieving sustained or improved production yields while reducing the cost of pumping water and the volume needed to meet production goals a lot of change will happen. This project depends on a few innovators and early adaptors to lead the charge and try new technology on their operation. Once others observe and hear about the success of the project they will be more eager to adopt the nozzles and management practices.

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 overall health of a watershed can be measured by the ecosystem benefits provided that improve our quality of life and the overall environment. By protecting the long-term sustainability of the Burr-Cook Paleovalley Aquifer's water supply this project is promoting the economic development of the network served by municipal water wells within the project area. Water users are located immediately within the project area which is situated within the South Branch Little Nemaha watershed within the Nemaha Natural Resources District. The project's impacted service area includes the Brownell Creek, Wilson Creek, Ziegler Creek, and Upper Little Nemaha Watersheds watersheds within the NNRD and covers portions of Lower Platte South's NRD (including Avoca, Manley, Cedar Creek, and Platte River State Park. Current and future water users rely on their municipal and rural water districts for safe and cost-effective water supply. Good quality water is essential to maintain adequate hydration and to sustain life while optimizing health and well-being. Clean, reliable water contributes to the economic prosperity of communities within watersheds. It additionally supports industries and provides employment opportunities and income for local residents, including agriculture. Healthy watersheds play a crucial role in building communities resilient to climate change impacts. This project enhances watershed health through the promotion of sustainable agricultural practices that reduce unnecessary water losses to the environment. Paired with the requirement of water use reporting for two growing seasons, this project furthers the work of the highly efficient nozzles by equipping producers with a flowmeter that provides information that can be utilized to make

informed irrigation decisions and evaluate profitability more precisely. Currently only 9% of systems have a flowmeter in place. Reduced pumping demand during peak irrigation times will reduce aquifer drawdown resulting in less energy required to pump groundwater for all beneficial, reducing cost and particulate matter emissions in the region. This project protects the health of the watershed by implementing practices that address water quality concerns. Uniform application of irrigation water prevents ponding, deep percolation, and runoff which can all adversely impact water quality, especially when chemigation is utilized.

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 2022-2023 Annual Report and Plan of Work for the State Water Planning and Review Process was utilized. Objectives addressed with this project include: 3D, 4A, and 4B. Objective 3D: Work to provide increased preparedness for future droughts, is addressed through this project's physical and educational components. The highly efficient irrigation nozzles will lead to a greater quantity of water remaining in the Burr-Cook Paleovalley Aquifer and elevate water levels. This will result in more water being readily available in the case of another drought. To receive cost-share for improved efficiency irrigation nozzles, participants will be required to have a flowmeter. A flowmeter is a tool that can be utilized with each irrigation event to ensure the desired amount of water was applied to the crop field. Incorporating flowmeter readings into scheduled irrigation equips the producer with information that can help them to meet agronomic goals, trouble shoot issues with the irrigation system, and be stewards of water resources. Through increased efficiencies in irrigation systems and enhanced stewardship driven decision making the threats of drought can be reduced. Objective 4A: Continue to find ways to reach constituents and stakeholders through public outreach events and surveys, is addressed through the partnerships with Otoe County Rural Water District #3 (RWD), and the Natural Resource Conservation Service (NRCS). The water supplier partners can send targeted water conservation tips along with monthly bills to help educate stakeholders on the importance of domestic water savings. Targeted mailings with information about the project will be sent to existing irrigators that are eligible for cost-share. Conversations from the point of application at the NRCS offices to final check out will foster relationships between producers and the technical experts. These relationships often lead to an increased knowledge of, and desire for, additional on-farm stewardship options through programs like Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP). Although this project is for a targeted area, the NRCS has a nationwide reach when disseminating information to agricultural producers, including those that irrigate. Utilizing the outreach and educational tools developed at National and State level NRCS offices will help our local NRCS offices to deliver the best messages to stakeholders of this project. Objective 4B: Work to streamline

communication of key materials for consumption by diverse stakeholder groups, is addressed using existing communication tools in place at the Nemaha NRD. A quarterly newsletter, website, and social media are all tools utilized at the Nemaha NRD to communicate with a wide demographic. Having information in a variety of places makes it more accessible to different demographics.

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.

Click here to enter text.