NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Upper Elkhorn and Lower Niobrara NRDs Aerial Imagery Project

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

Sponsor Business Name: Upper Elkhorn Natural Resources District

Sponsor Contact's Name: Joslynn VanDerslice

Sponsor Contact's Address: 301 N. Harrison St. O'Neill, NE 68763

Sponsor Contact's Phone: 402-336-3867

Sponsor Contact's Email: jvanderslice@uenrd.org

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

   Grant amount requested. $ $107,237.40

   - If requesting less than 60% cost share, what %? N/A

   If a loan is requested amount requested. $ N/A

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

2. **Neb. Rev. Stat. § 2-1507 (2)**

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

   If yes:

- Do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality? YES☐ NO☒
- Attach a copy to your application. N/A
- What is the population served by your project? N/A
- Provide a demonstration of need. N/A
- **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☐

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4. **Partnerships**

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

The partners on the project are the Upper Elkhorn Natural Resources District (UENRD) and the Lower Niobrara Natural Resources District (LNNRD). Holt County and Boyd County have provided additional funding for the project. Letters of support from the counties are included as attachments.

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

Upper Elkhorn Natural Resources District (UENRD) is responsible as the contact with the Department of Natural Resources for the grant and with the company who will be completing the aerial imagery and irrigation mapping. UENRD is also responsible for technical support for the irrigation mapping for the portion of the project within the UENRD.

Lower Niobrara Natural Resources District (LNNRD) is responsible for technical support for the irrigation mapping for the portion of the project within the LNNRD.

Holt County is an additional funding source and does not have any project responsibilities.

Boyd County is an additional funding source and does not have any project responsibilities.

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 total cost of the entire project is $178,729.00. All sources of funding will be applied to the cost for the aerial imagery and irrigation mapping. All sources of funding for the partner's 40% have been confirmed over the anticipated one-year project. The distribution of the cost of the project is included in the table below. Documentation for funding confirmation is attached in the letters of support from Holt and Boyd Counties.

Partners	**Contribution**	**Percent**
Upper Elkhorn NRD	$31,211.50	17.46%
Lower Niobrara NRD	$28,280.10	15.82%
Holt County	$10,000.00	5.60%
Boyd County	$2,000.00	1.12%
Water Sustainability Fund	$107,237.40	60.00%
TOTAL	**$178,729.00**	**100.00%**

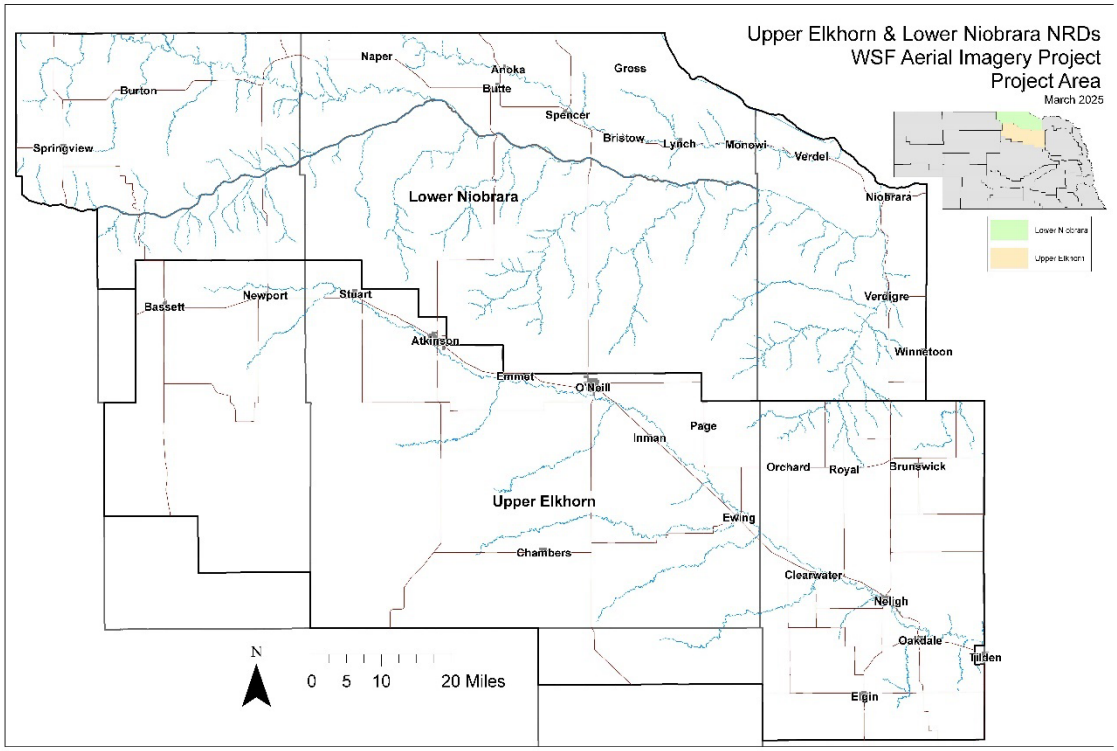
If the WSF funds are not obtained, since all the partners have obligated their portion of the funds, they would work together to figure out to what scale the project could still be implemented or if they would take on the additional funding

responsibilities. If there are no WSF funds available, it is also possible the project would need to be postponed to secure additional funding.

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!

The Aerial Imagery Project is a partnership between the Upper Elkhorn Natural Resources District (UENRD) and the Lower Niobrara Natural Resources District (LNNRD) along with funding contributions from Holt and Boyd Counties. The goal of the Aerial Imagery Project for UENRD and LNNRD and partners is to increase understanding of where irrigation is occurring in the project area. The project area is the district area for the UENRD and the LNNRD in North Central Nebraska and is shown on the map below. The project area is 5,693 square miles or 3,643,520 acres in size. The split of the project area is 54% UENRD and 46% LNNRD.



Aerial Imagery Project Area

The project stems from the need for improved information to provide more accurate data on the irrigation occurring in the project area. Upper Elkhorn NRD began the process of certifying acres irrigated by groundwater in 2011 but has been unable to finish the process. The initial information used is based on 2010 County Assessor Tax Records. Any fields that were not taxed as irrigated based

on the tax records slipped through the cracks since the data was not available to the NRD. Not knowing where the fields are or how many there are has resulted in data gaps in the NRD's irrigation dataset. The dataset is important as it is significant in many of the projects the NRD engages in. Knowing the irrigated acres in the district is necessary in effective management of the water resources and water use in the district. Lower Niobrara NRD is also looking to have a better understanding of irrigation occurring in their district. While they have finished irrigation certification within the district, having this data will allow them to verify no one has added additional water uses unknowingly. LNNRD is currently working on projects to increase their knowledge on water use, including a water use reduction program, and also seeking to identify the different qualities of the basins in the district.

Most of the work for the project will be completed by contractor, Cornerstone Mapping, who will collect aerial imagery using a camera mounted to an aircraft. The flights will take place from August to September. This time of year is required for data collection based on how plants in irrigated and dryland crop ground respond to stress, or lack thereof. Crops in dryland fields, because of stress due to less water, reach physiological maturity several weeks before irrigated crops making it easiest to distinguish between the dryland and irrigated at this time of year. Once the aerial imagery has been collected, it will be processed and delivered to the partners. Then Cornerstone Mapping will take the data and map the locations of irrigation. This information will be delivered in a format compatible with the programs utilized by all the partners.

The Natural Resources Districts anticipate the use of the data to identify where all irrigation, both groundwater and surface water, is occurring in the districts. Knowing where irrigation is occurring allows the districts to understand the effects of irrigation. The data provided in this project will be used to fill data gaps, complete certification of irrigated acres, provide more accurate data for models, and other unknown projects at this time. The counties intend to utilize the information to identify land use to increase tax efficiency.

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.

The project is expected to be completed within 4 months of initiation once WSF funds are available. The project tasks and the anticipated timeline are shown below:

Project Task	**Anticipated Completion**	**Partners Cost**	**WSF Cost**
Aerial Flights	August 10 – Sept. 12, 2025	Cost included as part of Aerial Imagery delivery	
Aerial Imagery delivery	Mid-late October 2025	$55,936.00	$83,904.00
Mapping Irrigated Acres delivery	Mid-late December	$15,555.60	$23,333.40
TOTAL		$71,491.60	$107,237.40
Total Project Cost		**$178,729.00**	

The timeline includes 2025 dates based on quotes provided by the contractor, however if based on the WSF Grant funding timeline the flights need to be flown in 2026, a similar timeline is projected with any cost differences being assumed by the partners.

Once the project is completed, the partners will immediately be able to utilize the aerial imagery and mapped irrigation. Since the data will be delivered in processed useable formats, the information can be integrated and utilized right away. The NRDs can compare the new irrigation information to the old data they have and identify gaps, and the counties can identify areas where there is inaccurate taxing and correct it.

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; N/A

1.A.2 Describe the plan of development (004.01 A); N/A

1.A.3 Include a description of all field investigations made to substantiate the feasibility report (004.01 B); N/A

1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); N/A

1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D); N/A

1.A.6 Discuss each component of the final plan (004.01 E); N/A

1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); N/A

1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2); N/A

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). N/A

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

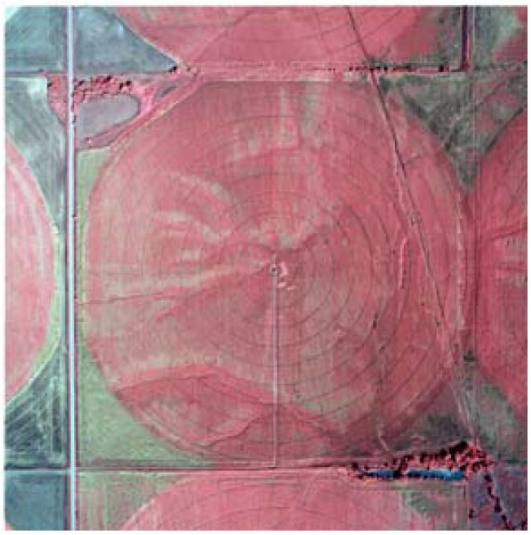
1.B.1 Insert data necessary to establish technical feasibility (004.02);

The Aerial Imagery Project will be completed utilizing remote sensing technology. Remote sensing is a powerful tool in agriculture. Crop health monitoring is a common precision agriculture application. Although Nebraska NRDs do not monitor farmers' crops for plant stress, the same techniques can be used to map water stress. The aerial imagery is used to detect water stress in crops, in turn, differentiate and map irrigated and dryland acres.

The basic science of monitoring vegetation is that chlorophyll will absorb blue and red light for photosynthesis. The green light is reflected, which is why plants appear green. When a plant is stressed, the photosynthetic process is reduced, and more blue and red light is reflected. A stressed plant will have a different shade of green or even start to turn yellow. Parallel to the changes in the visible spectrum, vegetation interacts with the near-infrared spectrum. Larger plants and healthy plants reflect more near-infrared energy, which is not visible to the human eye. As a plant becomes stressed the leaf cell structure changes and scatters the near-infrared light differently and is detected in the imagery.

Row crops will adjust their growth cycle to compensate for available nutrients and water. When row crops have plenty of nutrients and water the size of the plant is larger. During the spring and summer months dryland and irrigated crops often look similar to each other. However, there is not enough rainfall in Nebraska to sustain crops for the entire growing season. As a result, the dryland crops will reach physiological maturity several weeks before irrigated crops. The leaf cell structure changes significantly as the vegetation starts to dry down. It is during this window of opportunity that dryland and irrigated acres can be mapped through changes in color and near-infrared spectrums. An example of how the near infrared can assist the NRDs in identifying irrigation compared to traditional aerial imagery is shown below.

FSA imagery flown mid-summer. The dryland corner appears irrigated.



NRD imagery properly timed to distinguish irrigated from dryland crops.

Comparison of 3-band GRB aerial imagery (left) and 4-band RGB and near-infrared aerial imagery (right).

The partners plan to contract Cornerstone Mapping for the aerial imagery and irrigated acres mapping. Cornerstone Mapping has already worked with four other Nebraska NRDs since 2004 for this proven application. Central Platte NRD has twenty-one (21) consecutive years of imagery to support their certified irrigation management plan and Lower Loup NRD has sixteen (16) consecutive years of imagery. Data collection for these districts has resulted in the identification of years where 70 fields were identified as irrigated that were not previously, ranging from 5 to 130 acres in size.

The camera system used by Cornerstone Mapping acquires imagery in the blue, green, red, and near-infrared spectrums. The aircraft flies at 12,000-feet above ground level during data acquisition. There are no land access requirements since the aircraft and camera are very capable of collecting remote sensing data for mapping agricultural areas.

1.B.2 Discuss the plan of development (004.02 A);

The Aerial Imagery Project is projected to be completed within 4 months once the data collection is initiated. The tasks involved in the completion of this project include: collection of the aerial imagery, delivery of aerial imagery, and mapping and delivery of irrigated acres. The tasks of the project will be completed by Cornerstone Mapping and delivered to the NRDs and counties for use.

The project tasks and the anticipated completion timeframes are broken out below in the table:

Project Task	Anticipated Completion	Partners Cost	WSF Cost
Aerial Flights	August 10 – Sept. 12, 2025	Cost included as part of Aerial Imagery delivery	
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The timeline includes 2025 dates based on quotes provided by the contractor, however if based on the WSF Grant funding timeline the flights need to be flown in 2026, a similar timeline is projected with any cost differences being assumed by the partners.

The resulting deliverables will then be utilized by the UENRD, LNNRD, and county partners. While the work beyond the collection of the aerial data and delivery of the irrigation mapping is beyond the scope of what is being requested for the Water Sustainability Grant, the data will be of great importance to the partners. The NRDs will utilize the data to fill data gaps in the current irrigation layers of the districts, it will be utilized to provide more accurate datasets to include in models, it will improve the districts' water use information allowing for better water management throughout the district, and it will provide improved information to share with partners in larger regional projects. The counties will utilize the information to improve accuracy on taxing on irrigated acres throughout the counties.

1.B.3 Describe field or research investigations utilized to substantiate the project conception (004.02 B);

The process utilized by this project will build upon the work completed over the past 20+ years between Cornerstone Mapping and other Natural Resources Districts they have and continue to work with. The certification processes at UENRD and LNNRD have been completed through utilizing tax records and processing paperwork. The LNNRD has completed their certification process, however UENRD has not. The data collected in this project will allow for improvement and completion of the datasets. Current datasets have data gaps where fields that are irrigated were not taxed as irrigated when the certification process was initiated. There could also be holes where ground is being irrigated where the water use was not approved previously and ground has not been identified as being irrigated when it should be dryland.

Cornerstone Mapping's work with other NRDs has resulted in the identification of multiple acres and fields that were being irrigated at different acre amounts than

the districts had them certified at. Below is a summary of what one district working with Capstone Mapping identified over a four-year period:

Number of fields	Low Acre Amount	High Acre Amount
43	5.7	63.5
39	4.7	131.9
70	5.8	49.5
34	5.2	61.8

The results of their work, done in four consecutive years, and still identifying multiple cases where irrigation occurred in areas where it shouldn't shows the importance of having this project data. Without having the first year of data as a baseline and completed first dataset, none of the future work can be completed. This project will provide the districts with the knowledge and information they need to improve how they approach management throughout the districts.

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

This project does not require any water and/or land rights. All project data collection will be from an aircraft equipped with a camera.

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).

The Aerial Imagery Project will not have an effect upon any structural measures. The goal of the project is to identify the locations of all the irrigation in the project area and complete irrigation datasets.

Prove Economic Feasibility

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

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative.

The Aerial Imagery Project uses 4 band aerial imagery (Red, Green, Blue (RGB)and near-infrared imagery) to identify the acres irrigated in the project area at a 10 inch or 23-centimeter spatial resolution. The near-infrared data, which uses the differences in reflected colors between dryland and irrigated crops, along with the high-resolution imagery make it easier to see the differences between irrigated and dryland crops. The timeline for collecting the data for the project is weeks as shown in the table below. Once the data is collected, the contracted company can deliver the aerial imagery to the partners within 45 days and mapping of the irrigated acres within 60 days after that. The whole project can be completed from start to finish within a four-month timeframe.

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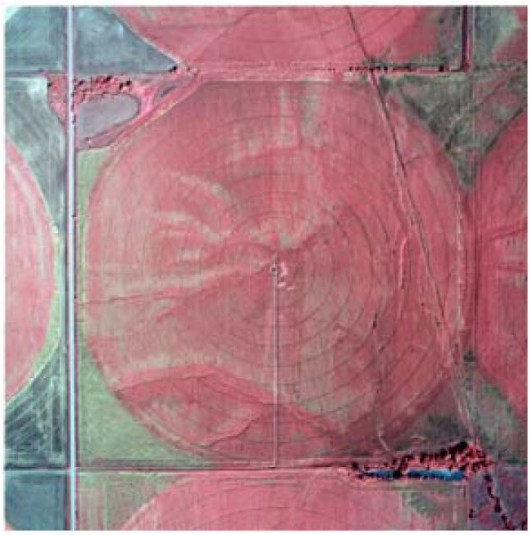
Alternative ways to collect data involve using aerial data flown for the National Aerial Imagery Program (NAIP) used by Farm Service Agency (FSA) and the Natural Resource Conservation Service (NRCS). This data is flown for different uses and therefore the resolution of the aerial imagery is 1 meter and it is only 3 band (RGB). There is no near-infrared included. The color spectrum of this data utilizes variations of green to identify where acres have been irrigated. The project area size is 3,643,520 acres (5,690 sq. mi.) between the UENRD and the LNNRD. To identify irrigated acres staff would have to analyze every individual quarter section of land within the project area to determine if it is irrigated and then using digital measuring tools measure the total acres in each piece. If staff's sole obligation was to map the irrigation from the imagery, it would take 3,795 hours to complete the investigation based on an average of 10 minutes spent looking at each of the 22,772 quarter sections in the project areas. If one staffer, paid $30 an hour, were to devote time solely to this project it would take roughly 474 eight-hour days and cost $113,850.00 excluding any field visits required or extra time spent on quarter sections that are not straightforward. This would require the staff to ignore all of their other job duties and neither district has the staff to devote to just this project alone.

The image below depicts the differences between the imagery options on the same quarter section of land. The left image is National Aerial Imagery Program (NAIP) image, and the right is imagery using the 4-band option which includes near-infrared imagery. This example comes from Cornerstone Mapping.

FSA imagery flown mid-summer. The dryland corner appears irrigated.



NRD imagery properly timed to distinguish irrigated from dryland crops.

Comparison of 3-band GRB aerial imagery (left) and 4-band RGB and near-infrared aerial imagery (right).

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 total cost, $178,729.00, for this project was quoted by the company who would be completing the work, Cornerstone Mapping. All of the tasks and costs of the project are included in the work Cornerstone Mapping will be completing.

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Total Project Cost		**$178,729.00**	

The timeline includes 2025 dates based on quotes provided by the contractor, however if based on the WSF Grant funding timeline the flights need to be flown in 2026, a similar timeline is projected with any cost differences being assumed by the partners.

The primary benefit of this project is the improvement of the irrigated acres datasets for both NRDs. The Lower Niobrara will utilize the data to verify the certified acres they have completed, while the Upper Elkhorn NRD will utilize the data to fill data gaps to be able to complete the certification of irrigated acres within the district. The advancement of the dataset will improve all aspects of management for the NRDs. The data is a basis for many projects the districts are engaged in. Both districts are a part of group/regional projects where modeling is used. One of the layers often used in models is the number and location of irrigated acres within the project area. This project will provide an updated completed dataset for the districts to use. Identifying the location of all irrigation within the project area will allow the districts to make more informed decisions when making decisions on management including updates to rules and regulations. The project will also benefit the county partners who can use the data to identify ground that should be taxed as irrigated ground and currently isn't.

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).

All the costs for this project are for contracted services. The whole of the project costs detailed in the table below are contained in the quotes provided by Cornerstone Mapping. The quotes also contained a timeline of anticipated completion dates for each task. From start to finish the project is anticipated to take around 4 months.

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Since the project is anticipated to be completed within one year there are no additional costs beyond those with the contractor. However, the partners will be responsible for maintaining use of the programs that interact with the data. Those costs would be accounted for the yearly operating budgets.

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).

There is no generally accepted method for calculation of primary tangible benefits for this project.

This project will increase water sustainability through identification and mapping of all irrigated acres in the project area. Identification of the number of irrigated acres can assist in better modeling when looking at water sustainability. One project the Upper Elkhorn NRD is a member of is the Lower Platter River Basin Coalition (LPRBC). This group works to protect the long-term balance of the Lower Platte River Basin's water uses and water supplies by allotting the members a certain depletion amount over an increment of time. The depletion allotments are calculated using models. Inputs into the models include the irrigated acres in each district. This project would allow for the Upper Elkhorn NRD to provide a more accurate number of acres for the models and keep the flows at sustainable levels in the Lower Platte River Basin. The current dataset the Upper Elkhorn NRD utilizes has known data gaps, where there are incomplete certifications and likely unknown irrigated fields. This provides less accurate information to be plugged into the models and results in allotted depletion amounts that could be improved with a better dataset. Flying the district and getting the resulting complete irrigation layer will improve the data included in the model, providing a more accurate number for the district and increasing the chances of keeping the Lower Platte River Basin sustainable long term.

Knowing the irrigated acres in the districts is also important for the Niobrara River Basin Alliance (NRBA); both Lower Niobrara and Upper Elkhorn NRD are members of the alliance. This alliance, which includes three other NRD members and works with state agencies, is focused on working together to ensure the long-term sustainability of sufficient water in the Niobrara River Basin to safeguard future economic activity, agriculture, other water users, fish and wildlife, and recreation activities along the Niobrara River for generations to come. The information gathered in this project is important for the NRBA for improved data when it comes to assessing the basin's appropriation status. Identifying if a basin is at its capacity for the use of resources or can sustain

additional uses involves having the most accurate data possible. Inaccurate data can skew the result of a study and potentially result in an inaccurate determination. Having this information will provide updated accurate data on the current conditions on the river, showing all the irrigation occurring within its reaches, both ground and surface water irrigation.

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 total project cost is $178,729.00. The cost is split 40% between the partners and 60% for Water Sustainability Fund. The table below shows the breakdown in dollars and percentages on how the partners and the WSF would be contributing to the project:

Partners	**Contribution**	**Percent**
Upper Elkhorn NRD	$31,211.50	17.46%
Lower Niobrara NRD	$28,280.10	15.82%
Holt County	$10,000.00	5.60%
Boyd County	$2,000.00	1.12%
Water Sustainability Fund	$107,237.40	60.00%
TOTAL	**$178,729.00**	**100.00%**

The benefits of the project are not able to be presented in a table with a dollar value assessment. The main benefit of this project is data collection. The partners' current datasets have data gaps that would take an unknown amount of staff time over multiple years to identify. This project provides data that is readily available to staff to utilize in a very short time frame; within four months the project is completed and the staff have a new dataset to utilize immediately. The new dataset will provide a way to verify the number of acres being irrigated, identify the location of irrigation, updates to models input layers, and a way to improve management decisions. There is no dollar amount that can be assessed to the benefits of the project as some of the projects this would assist are yet unknown. Having this dataset provides a baseline for future work for the partners to build off of.

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.)

The total cost of the Aerial Imagery Project is $178,792.00. The next best alternative is difficult to calculate a cost for as it relies heavily on data collected for other projects and is subject to staff speed. The next best alternative to the 4-band aerial imagery with near-infrared and irrigation mapping is to utilize existing

3 band aerial imagery collected at a lesser resolution; 1 meter resolution compared to 10-inch (23 centimeter) resolution this project will collect imagery at. To complete the project with the aerial data flown for the National Aerial Imagery Program (NAIP) used by Farm Service Agency (FSA) and the Natural Resource Conservation Service (NRCS), staff must first wait for it to come out. The imagery is collected every even year for Nebraska; however, it takes months for the imagery to become available for use. Once the data is available, NRD staff would have to individually assess each quarter section for irrigation, which with 5,693 square miles in the project area, would mean there are roughly 22,772 quarter sections of ground to check for irrigation. If each of those quarter sections were to take 10 minutes on average to check and measure the irrigation it would take 3,795 hours or 474 eight-hour workdays to check every quarter section. If one employee were to complete all of this work themselves at $30 an hour it would cost roughly $111,850 to complete the next best alternative.

Other NRDs who have conducted similar aerial imagery projects with the same contractor have returned results over a four-year time frame identifying unknown or overwatered acres on fields each year. The table below shows the results; they range from about 5 acres to 130 acres found on 34 to 70 fields in a single season. Without having an initial flight, none of the additional flights and verification of irrigated acres, which increases information on water uses, would be possible.

Number of fields	Low Acre Amount	High Acre Amount
43	5.7	63.5
39	4.7	131.9
70	5.8	49.5
34	5.2	61.8

If 40 fields were found from completing the Aerial Imagery Project to be watering 5 acres over what they were supposed to be that is 200 acres being used that was previously unknown. The average distribution of how many acres were typically found being watered that shouldn't have been per field on the example district's fields is unknown. However, unless the project area is flown it is unknown if the values found will be closer to an average of 5 acres per field at 200 acres identified, or 130 acres per field, which over 40 fields would result in 5,200 acres that could be unknowingly irrigated. Identifying the data gaps allows for a more accurate calculation of water use and how stream flows are affected by irrigation. This project would not just identify groundwater irrigated acres, it would also identify the active surface water users. Identifying all the users in the system would allow the districts to determine in the future if or how future uses would affect the stream flow and if they should be allowed.

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.

   The Upper Elkhorn NRD has budgeted the required matching funds for the fiscal year FY2025-2026. The Lower Niobrara NRD has also budgeted the required matching portion. Holt County has proved a letter of support committing their portion of the funds. Boyd County has also included a letter of support from both the county supervisors and the assessor's office. The three letters of support are all attached.

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

   Since the Aerial Imagery Project is a data collection project, there will be no OM&R costs. Any costs to the partners for items relating to data collected for the project, like program costs to utilize the data, are and would remain budgeted by the partners.

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 (i.e. timing vs nesting/migration, etc.).

   The Aerial Imagery Project has very minimal impacts on the natural environment. The aerial collection portion of the project does not include any ground disturbance since collection is performed from a camera on an aircraft. All Federal Aviation Administration (FAA) regulations will be observed and the responsibility of the contracted Cornerstone Mapping. Aerial imagery from an aircraft has lesser impacts than one of the potential alternative methods of having to drive out and physically investigate individual fields which could result in compaction from driving in fields.

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

   The Natural Resources Districts were established by the Nebraska Legislature in 1969 when LB 1357 was passed. The NRDs were given 12 responsibilities to uphold, one of those responsibilities being "Development, management, use, and conservation of groundwater and service water" and another being "Water supply for any beneficial use". The Upper Elkhorn NRD and the Lower Niobrara NRD are the local responsible party for groundwater control. This project enhances the NRDs knowledge on where irrigation is occurring within their district boundaries. Increased knowledge can lead to more informed rules and regulations pertaining

to the control of water within the districts. Both NRDs have previously been awarded and have maintained grants from their offices including for improvements to their datasets like the Aerial Imagery Project will do. The counties are directed by state statue to conduct inspections of every parcel at least once every six years. Counties are responsible for determining land use to ensure correct taxing.

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

The project considers plans and programs at the local level and also larger regional plans, including the following:

- Voluntary Integrated Management Plan (V-IMP): The Upper Elkhorn NRD and the Lower Niobrara NRD have each developed a V-IMP jointly with the Nebraska Department of Natural Resources (DNR). The effective dates are as denoted below:
    - Upper Elkhorn NRD: February 1, 2019
    - Lower Niobrara NRD: May 1, 2014

  As both plans were developed with DNR, the purpose of both plans is very similar: “Attain and maintain a desired balance between uses and supplies of both surface water and groundwater sources so economic viability, as well as social and environmental health, safety, and welfare can be achieved and maintained in the District for both the near-term and long-term while considering effects on existing surface water appropriators and groundwater users.”

  The information collected by the Aerial Imagery Project will provide data that will support the purpose of each V-IMP. The data collected by this project identifies the location of all irrigation in the project area. There is no specification when identifying irrigated acres if it is groundwater or surface water irrigated. This information will be corroborated by the NRD staff with the existing groundwater certified acres information, the registered groundwater wells information between the NRDs and DNR, as well as with the DNR surface water rights/appropriation information. Having the data will allow the districts to improve their short-term information by identifying the gaps in their data and identify all of the current uses in the project area. Long term, the project will benefit the districts when looking at prospective new uses they can utilize the irrigation data in models and scenarios to see what the effects would be on the system.

- Lower Platte River Basin Water Management Plan: The Lower Platte River Basin Water Management Plan was jointly developed between the Nebraska Department of Natural Resources Districts and the seven Natural Resources Districts where at least a portion of each district falls within the Lower Platte River Basin. The Upper Elkhorn NRD is one of the seven NRDs involved in this project. The LPRBC works to keep sustainable flow in the Lower Platte River Basin. To do this the coalition members have agreed to come together

and develop a plan and allocations for a maximum amount of new development that can be implemented over a designated time period, called an increment. The increments are five years and the allotted amount of acre feet available to each member is dependent upon their information including their irrigated acres. This project would allow for a more accurate dataset for the Upper Elkhorn, which would improve the numbers included in the modeling for the district; not only providing a better number for the district, but a better representation throughout the whole Lower Platte River Basin.

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

If yes:

10.A Provide a complete listing of all lands involved in the project. N/A

10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held. N/A

10.C Provide assurance that you can hold or can acquire title to all lands not currently held. N/A

11. Identify how you possess all necessary authority to undertake or participate in the project.

Nebraska's Natural Resources Districts (NRDs) are specifically tasked by the legislature to manage groundwater as well as the hydrologically connected groundwater and surface water. Which includes municipal, domestic, and agricultural uses (Nebraska State Statute Chapter 2 Article 32 and Nebraska Groundwater Protection Act Chapter 46 Article 7).

12. Identify the probable consequences (environmental and ecological) that may result if the project is or is not completed.

A probable consequence that may result if the project is not completed is continued overuse of irrigation. Unidentified uncertified fields exist within the project area. Without someone/something bringing attention to them, because of the holes existing in both the NRDs and the counties' systems, it is probable the acres/fields will continue to be watered and skew the water use data in the district for years. Due to the size of the districts, staff size, and additional responsibilities of the NRDs it can take time for something like a few extra irrigated acres to get noticed by staff. If the inconsistencies are not identified they cannot be corrected, and the dataset will continue to have gaps.

Building off of not knowing the exact number of irrigated acres and location of the irrigation occurring in the project area is the probability of inaccurate modeling.

Without knowing the exact number of irrigated acres in the districts, everything is based off the number of acres the NRDs know, which is only a portion of the whole. This can be detrimental to the districts when including the data into models. The results could leave the districts with inaccurate assumptions about water use in the districts based off the skewed model results.

It is also probable if the project is not completed there could continue to be inaccurate taxing on crop ground. If it is not known ground is being irrigated because it is currently not being taxed that way until someone reports it, then it will continue to be taxed inaccurately as dryland, grassland, etc. until the county gets the time or capability to investigate that portion of the county. The inaccurate taxing could result in the inaccurate amount of money that could be distributed to the NRDs and other taxing authorities which can skew the amount of money they believe they have available for their budgets.

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 to 6 for items (1) - (9); and 0 to 3 for items (10) - (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 72 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;

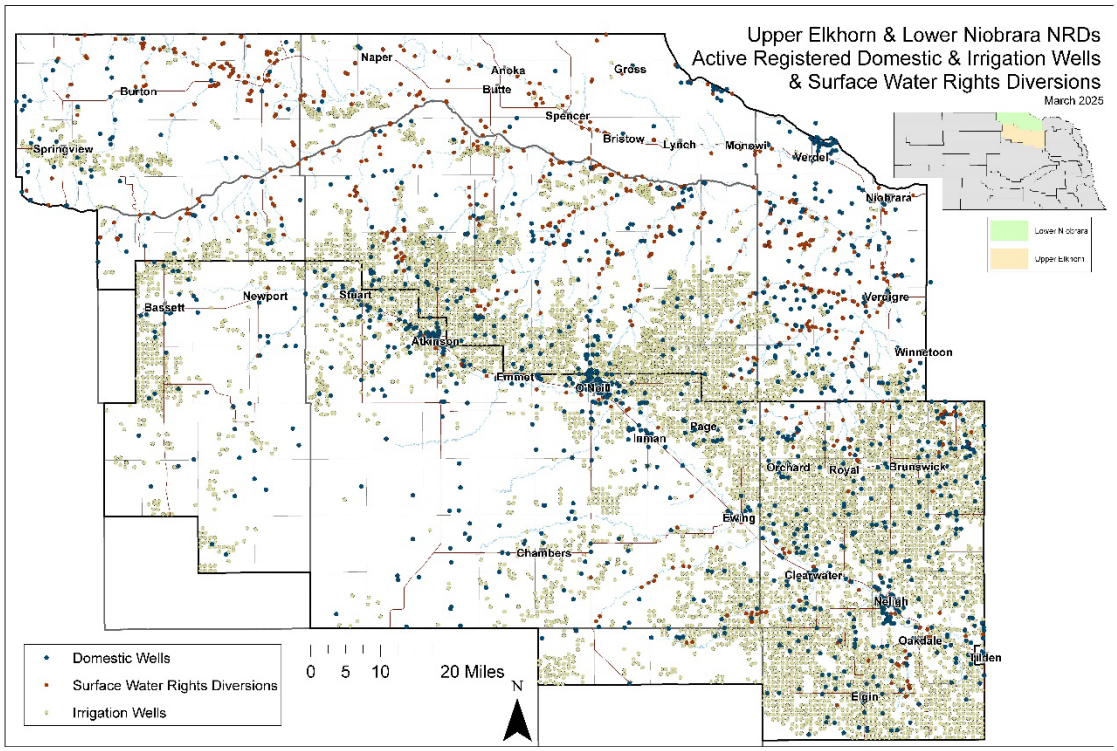
   - Describe the specific threats to drinking water the project will address.
   - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
   - Provide a history of issues and tried solutions.
   - Provide detail regarding long-range impacts if issues are not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

   A large portion of the project area is rural agricultural areas where drinking water comes from groundwater wells. In the project area, according to the Nebraska Department of Natural Resources well database, there are 1,326 active

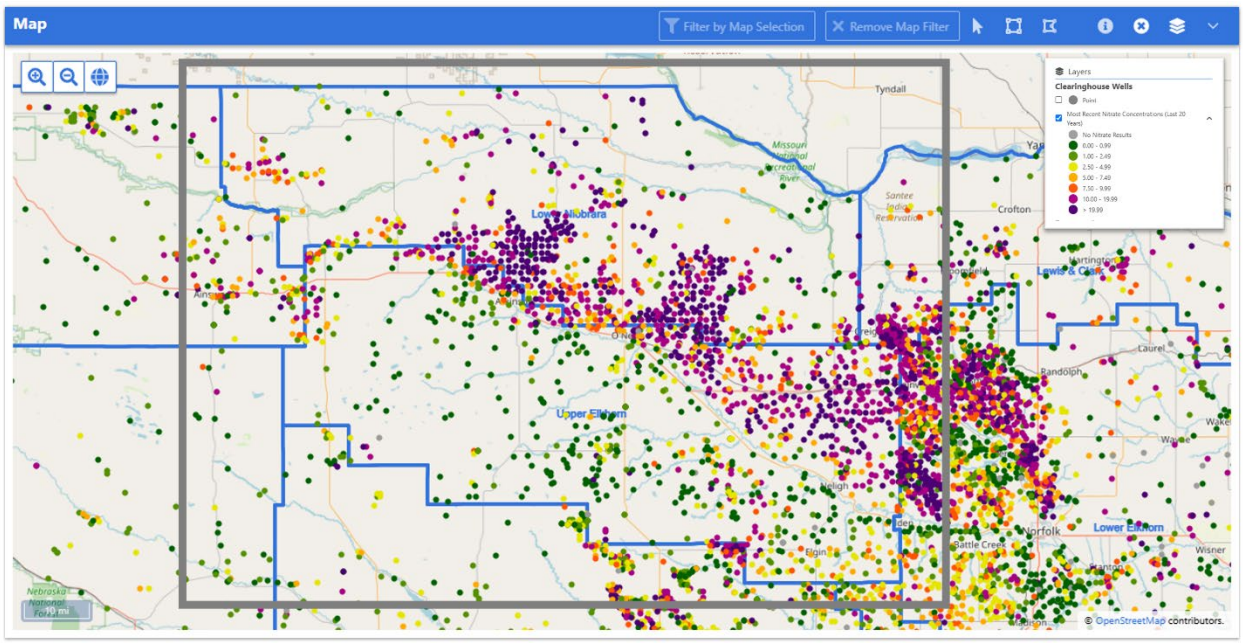
registered domestic wells (UENRD-829, LNNRD-497). Domestic wells in agricultural areas are intermixed in location with irrigation wells, as shown in the map. There are 7,248 actively registered irrigation wells within the project area (UENRD-4,551, LNNRD-2,697). Surface water irrigation is also intermixed in those areas and is also shown in the map below. Domestic wells are affected by agricultural activities in the project area. The second map below shows the most recent results turned into the Nebraska Clearinghouse for nitrate results. The Environmental Protection Agency (EPA) has set a Maximum Contaminant Level (MCL) for nitrate in drinking water at 10 parts per million (ppm). Due in part to agricultural activities in the area, domestic wells are afflicted by high levels of nitrate. The nitrate levels can increase with over pumping of irrigation water as it has been identified as a major contributor to increased nitrate leaching into groundwater.

The nitrate problem is not a new issue for the project area, work has been occurring since at least the 1980s in a portion called the Bazile Groundwater Management Area (BGMA) where township nitrate averages can be close to double the MCL. To combat rising nitrate concentrations the BGMA, four NRDs and their agency partners, have been working diligently to educate those who drink the water and utilize nitrogen to its effects and implement best management practices (BMPs). All entities involved in the project know the problem of nitrate will not go away overnight and continued effort will be necessary in the future. The Upper Elkhorn and Lower Niobrara NRDs contain about half of the BGMA and also have nitrate issues that extend to other portions of the district as identified by the Clearinghouse nitrate result map.

This project can provide valuable information to the NRDs and any local entities who come to the NRDs for assistance in identifying places for new public water supply or private water wells. The aerial imagery and mapped irrigation can provide previously unknown information. The aerial imagery as a higher resolution imagery than previously available, will be a resource that when used in tandem with the mapped irrigation data will be able to provide insight into where any potential nonpoint contamination sources could be. This is useful for communities, rural water systems, and private individuals when selecting locations for new wells to help in identifying potential areas where there could be less potential for contamination, both short and long-term. The data collected in the project will also be valuable to the NRDs in water use, as overwatering leads to increased leaching, knowing the acres where the irrigation is occurring can help the NRD to identify the next steps in management decisions in protecting groundwater as a drinking water source.



Active Registered Domestic and Irrigation Wells and Surface Water Rights Diversons.



Nebraska Clearinghouse Most Recent Nitrate Sample Result Map of Project Area.

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.

Upper Elkhorn NRD and Lower Niobrara NRD both have worked with the Nebraska Department of Natural Resources to develop Voluntary Integrated Management Plans (V-IMP). This project meets the goals and objectives of both districts' plans as detailed below:

- Upper Elkhorn Voluntary Integrated Management Plan: The Upper Elkhorn NRD developed a Voluntary Integrated Management Plan with the Nebraska Department of Natural Resources, which has been effective since February 1, 2019. The goal and objectives the Aerial Imagery Project best benefits is Goal 1 and its supporting objectives:
    - Goal 1: Understand water supplies and uses within the District.
        - 1.1: Develop and maintain a database of water supplies and uses within the District.
        - 1.2: Evaluate variability in water supply and uses.

  This Aerial Imagery Project addresses this goal and objectives by providing new data to supplement where the NRD might have data gaps. As part of this goal and the V-IMP the UENRD has been working to certify all of the irrigated acres in the district. This has been done utilizing what the county had as irrigated acres when the project was initiated. If there was ground that should have been taxed as irrigated but wasn't then the respective acres wouldn't have been accounted for. This project eliminates those data gaps by providing a mapped irrigation layer that does not rely on the tax record, which can be skewed by inaccurate tax information, but relies on the high-resolution aerial imagery collected as part of this project. The high-resolution aerial imagery, which includes the near infrared data, will allow the NRD to have more accurate data layer, which will allow us to improve our work towards the V-IMP goals, by improving the districts understanding of water supplies and uses withing the district and improving the database.
  Upper Elkhorn NRD V-IMP Goal 2 is also addressed by the aerial imagery project:
    - Goal 2: Prevent or mitigate water related conflicts within the District.

  By identifying all of the ground where irrigation is occurring, the District is provided with information to help prevent future use conflicts. If it is known where all the current uses are, when new uses are considered the effects on current users can be analyzed to prevent potential issues down the road for either user.

- Lower Niobrara Voluntary Integrated Management Plan: The Lower Niobrara NRD developed a Voluntary Integrated Management Plan with the Nebraska Department of Natural Resources which has been effective since May 1, 2014. The goal and objectives the aerial imagery project best benefits are Goal 1 and its three Objectives:
    - Goal 1: To develop and implement processes for the adequate collection of hydrologic and other related data to assess water resources within the District.
      Goal 1 Objectives:
        - 1.1: To conduct data collection and analyses of water supplies and demands, utilizing the best available information, data, and science
        - 1.2: To conduct studies to identify hydrologically distinct sub-areas within the District for the purposes of integrated management.
        - 1.3: To monitor changes in water uses within the District.

  The Aerial Imagery Project increases the district's knowledge of water use within the District using technologically advanced techniques to identify where irrigation is occurring throughout the district. It allows the Lower Niobrara to verify the information they currently have for irrigated acres and identify any locations where irrigation is occurring and either shouldn't be or was previously unknown. This increases the accuracy of the NRD's data and allows them to better develop studies on the water use in the district to meet the V-IMP goals.
  Lower Niobrara NRD Goal 3 of the V-IMP is also met with this project.
    - Goal 3: To prevent, resolve, and minimize water related conflicts among and between surface water and groundwater users.

  By having this snapshot in time with the aerial and having the irrigated acres mapped the district can identify current uses which can protect future users from conflicts.

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

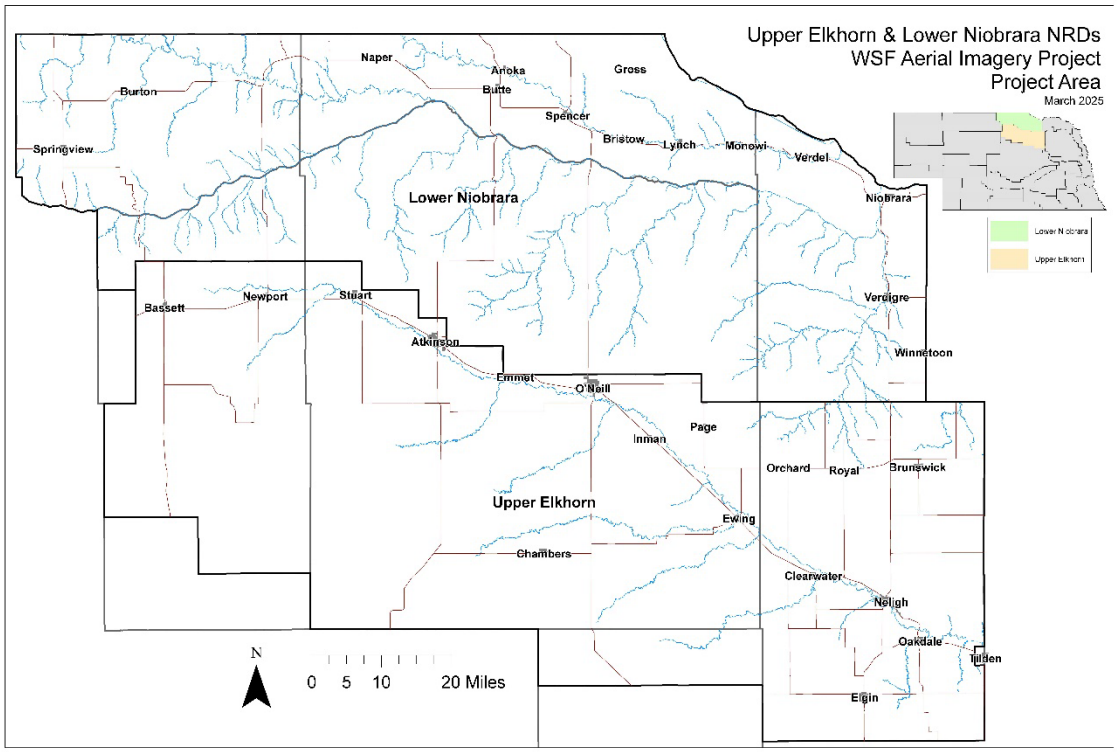
   List the following information that is applicable:

   - 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.

   The Aerial Imagery Project contributes to water sustainability goals by providing a basis to build on. The aerial imagery and particularly the irrigation mapping will be able to be utilized in future projects that work to meet all three of the listed water sustainability goals. Having the irrigation baseline would allow for the

irrigation data to be used in any future modeling endeavors at local, state, or even regional levels. This information will also serve as a comparison that can be utilized to show changes over time. If a similar project is ever conducted in the future, the differences between the years show changes in where water use occurs, visually show any changes in streamflow, if water bodies have dried up or expanded.

The Upper Elkhorn NRD and the Lower Niobrara NRD are neighboring NRDs in North Central Nebraska as shown in the map below. The majority of each district lies in neighboring river basins; Upper Elkhorn – the Elkhorn River Basin (part of the Lower Platte River Basin) and Lower Niobrara – the Niobrara River Basin. The major basin of work for the Upper Elkhorn is typically the Elkhorn River Basin and the Niobrara River Basin for the Lower Niobrara, however a portion of the Upper Elkhorn is a part of the Niobrara River Basin. Both NRDs are members of the Niobrara River Basin Alliance (NRBA). The group, comprised of five NRDs, is working together to ensure the long-term sustainability of sufficient water in the Niobrara River Basin to safeguard future economic activity, agriculture, other water users, fish and wildlife, and recreation activities along the Niobrara for generations to come. Work in this basin is continual and having the improved dataset to include in any appropriation discussions and future modeling endeavors could make a difference in the evaluation of the River.



Aerial Imagery Project Area

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 Aerial Imagery Project provides data for use in many current and future projects and in doing so contributes to multiple of the water supply goals. By collecting and having the aerial imagery available and the mapped irrigation data, the districts and the counties are able to understand how the irrigation demands are distributed throughout the project area. This is useful for flood control, agricultural use, municipal and industrial uses, conservation of water resources, preservation of water resources, and can even contribute to recreation and wildlife habitats. The basis for the project is to improve current datasets with more accurate information that can then be put to use in multiple ways. The project data will be utilized by the counties to verify accurate taxing of specifically agricultural ground. The NRDs will be able to improve the accuracy of their irrigated acre datasets which will improve their ability to make management decisions for water quantity and quality. The NRDs will likely utilize the data in any future model work, as it will provide the most accurate information available to the district on irrigation. The irrigation data can be utilized by the district in models for things like water use, analysis of streamflow, and where depletions could be occurring. The full array of the long-term benefits of this project are unknow as it is yet unclear what future endeavors the NRDs or counties will take on that will benefit from this work.

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 beneficial uses of the Aerial Imagery Project include the sharing of the collected data. The Upper Elkhorn NRD and the Lower Niobrara NRD provide data to the Nebraska Department of Natural Resources each year on the number and location of irrigation in their districts. Having a more accurate dataset available to share will not only improve local projects the NRDs are working on, but also statewide projects.

With the increased knowledge of the irrigation use in the districts all efforts can be more accurate, which can lead to more accurate calculations, better modeling efforts, and better regulations as deemed necessary. The data will improve both NRDs' irrigated acres datasets, verifying Lower Niobrara's and allowing Upper Elkhorn to complete their acre certification. Having this data will also allow the board of directors to make more informed decisions when updating rules and regulations pertaining to irrigation in the districts.

One example of this is through the Lower Platte River Basin Coalition. The Upper Elkhorn NRD is one of seven NRD members who work with the Nebraska Department of Natural Resources to maintain streamflow in the lower reaches of the Lower Platte River Basin. Each 5 year increment the members are each allotted a maximum depletion amount. That is a conservative maximum amount of new acres feet of depletion that can be added to the current depletions and not have a negative effect on the streamflow of the river. To determine the allowed depletion amount, a model is run and the data input into the model includes the irrigated acres in the district. The current data has known data gaps where acres have not been certified; having the new data from this project would allow for a more accurate input layer from the Upper Elkhorn NRD resulting in a better model and more precise depletion value.

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 Aerial Imagery Project only has one cost: the work from the contractor Cornerstone Mapping ($178,729.00). This one amount covers the cost for collecting data via aircraft and the interpretation of the data into a usable mapped irrigation layer. The full costs of the project are shown below in the table. This project is also a one-time cost to the partners with no maintenance. This is of significantly lower cost than alternative options as the amount of partner staff time is minimal. Other options, which could be utilizing other forms of aerial imagery and measuring individual fields digitally, or actually going out to locations to measure, are highly labor intensive. For this project all of the work is completed by Cornerstone Mapping, saving staff time and allowing them to utilize the data collected almost immediately. No alternative method provides the data in as quick of a timeframe, or without a massive time commitment requirements from staff. All other options require a heavy amount of screen and or drive time to collect the same data.

Project Task	**Anticipated Completion**	**Partners Cost**	**WSF Cost**
Aerial Flights	August 10 – Sept. 12, 2025	Cost included as part of Aerial Imagery delivery	
Aerial Imagery delivery	Mid-late October 2025	$55,936.00	$83,904.00
Mapping Irrigated Acres delivery	Mid-late December	$15,555.60	$23,333.40
TOTAL		$71,491.60	$107,237.40
Total Project Cost		**$178,729.00**	

The timeline includes 2025 dates based on quotes provided by the contractor, however if based on the WSF Grant funding timeline the flights need to be flown in 2026, a similar timeline is projected with any cost differences being assumed by the partners.

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 way the Aerial Imagery Project helps the partners at the NRDs and county levels can be extrapolated up to the larger state and regional levels. The data collected can and will be shared. The Upper Elkhorn NRD and the Lower Niobrara NRD already provide data to the Nebraska Department of Natural Resources each year on the number and location of irrigation in their areas. Current datasets rely only on the acres the districts have been able to certify utilizing tax records. If there are inaccuracies in the tax records, there isn't a way for the NRDs to correct the issues unless they come upon it or someone lets them know. The new data collected with the project will result in a more accurate dataset that isn't reliant on the accuracy of the tax records. The tax records will also improve with this data coincidentally as the counties are partnered with the NRS. The project data will be provided to the NRDs in format that will be available to share. With the increased knowledge of the irrigation use in the districts all efforts can be more accurate, which can lead to more accurate calculations, better modeling efforts, and better regulations as deemed necessary.

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 is a building block for potential future work to protect property. It provides benefits to the entire project area, particularly in areas of heavy irrigation and along the river where water use is at a premium. Having the current (or past if the work is conducted in the future) irrigation mapped out can be beneficial to many projects. The resulting Geographic Information System (GIS) layer that will be a product of this project can be integrated into many scenarios. For example, if someone is looking at flood control along the river, or how irrigation is affecting stream flow, or the potential of drilling a public water supply well, the location of all irrigation in the area can be identified and used in combination with other data like a registered wells layer. The completion of this project will allow the partners and other agencies a more accurate piece of information for the further protection of groundwater and surface water and their uses. The cost savings of completing this project is largely in labor; the amount of time staff would have to digitally or physically measure where irrigation is occurring.

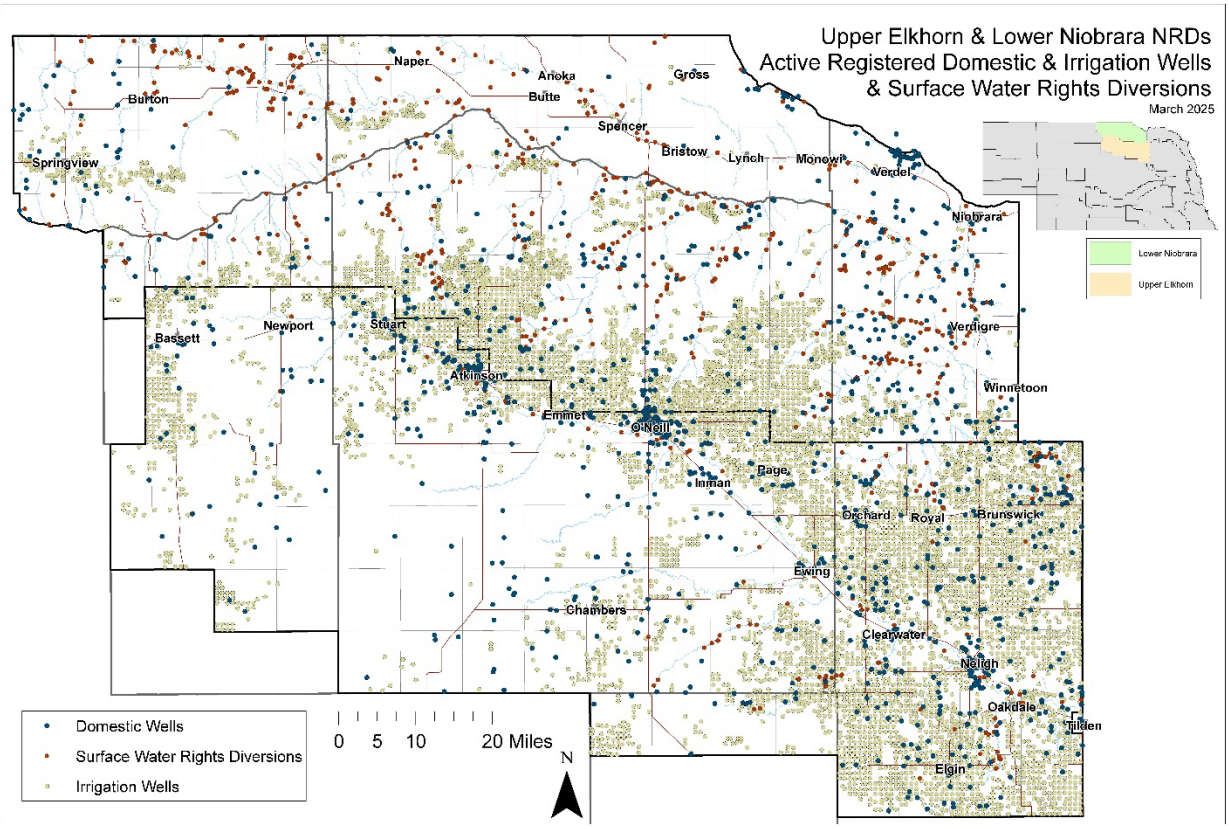
9. Improves water quality;

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

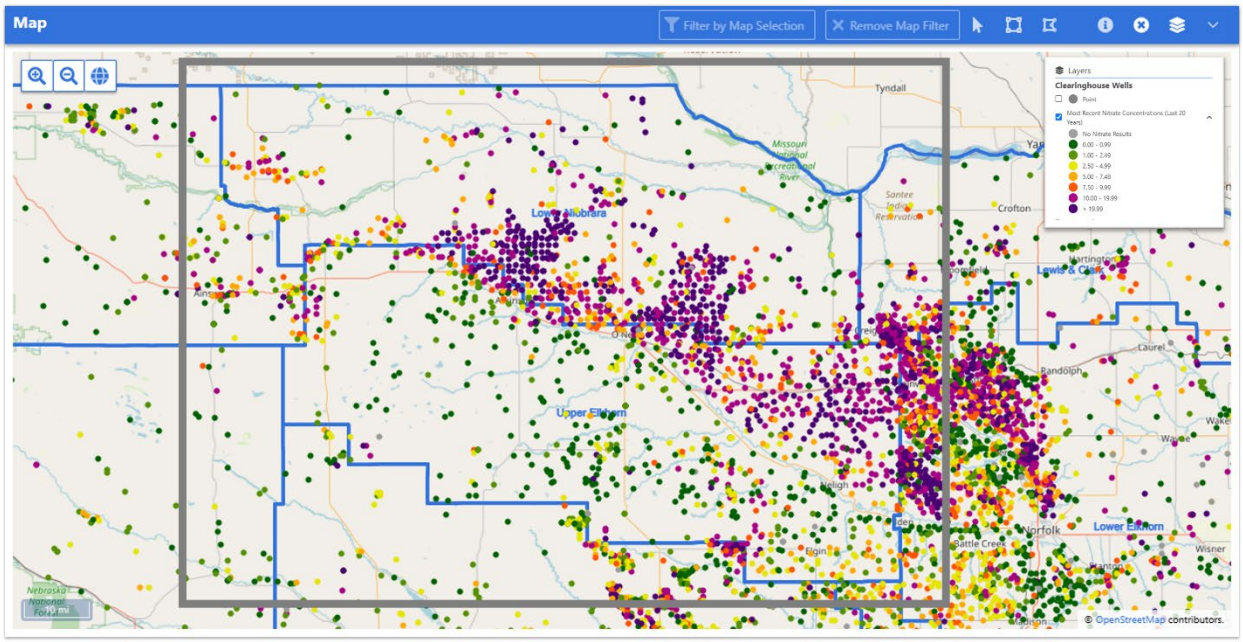
   Water quality is of great importance to the Upper Elkhorn and Lower Niobrara NRDs, large portions of the districts have nitrate levels that exceed the Environmental Protection Agency's Maximum Contaminant Level (MCL) of 10 parts per million. Studies conducted in the area have identified commercial fertilizer as a large contributor to the nitrate issue. Overwatering on irrigated acres, especially in the sandy soils of the project area, can cause increased

leaching of nitrate and reach groundwater sooner. As shown in the images below, there is a large amount of irrigation that occurs in the project area, and nitrate is of great concern throughout the entirety of the two districts.

Identifying all of the locations where irrigation is being applied and filling the gaps in the partners' knowledge will allow for a better understanding of the potential sources. The increased information available from the data collected in this project can benefit everyone in the project area, for multiple types of water use: residential, industrial, agricultural, or recreational. The benefits include the identification of current uses and the ability to include this dataset into models to identify the impacts of future uses, for example if a new industry would want to come to an area, would there be enough water to not affect current water users? Communities, rural water systems, and private citizens could work with the NRDs utilize the data when looking and current or future areas for water sources. The agricultural sector will benefit by having the acres they will be able to continue to irrigate, knowing where potential water quality contaminants are can help to limit future issues and help the districts in mitigating current ones.



Active Registered Domestic and Irrigation Wells and Surface Water Rights Diversons



Nebraska Clearinghouse Most Recent Nitrate Sample Result Map of Project Area.

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 Upper Elkhorn and Lower Niobrara NRDs along with Holt and Boyd Counties are supporting this project. The project is anticipated to be completed within four months of being started. The letters of support from the counties to the NRDs are attached and the partners' financial breakdown is listed below:

- Upper Elkhorn NRD: The Upper Elkhorn NRD is contributing $31,211.50 which is 17.46% of the project total. The FY2024-2025 levy was 0.028963 with a total valuation of $5,563,946,800.00. The Upper Elkhorn NRD also utilizes funds from the Natural Resources Water Quality Fund, receiving approximately $46,000 in FY2024-2025.

- Lower Niobrara NRD: The Lower Niobrara NRD is contributing $28,280.10 which is 15.82% of the project total. The FY2024-205 levy was 0.031329 with a total valuation of $3,481,767,993.00. The Lower Niobrara NRD also utilizes funds from the Natural Resources Water Quality Fund, receiving approximately $28,000 in FY2024-2025.

- Holt County: Holt County is contributing $10,000.00 which is 5.60% of the project total. Holt County's total 2024 valuation was $3,509,334,930.00. Holt County's FY 2024-2025 operating budget was $15,420,373.70 with $10,750,000.00 of that required from the Holt County tax levy. The 2025-2026 budget is anticipated to be similar.

- Boyd County: Boyd County is contributing $2,000.00 which is 1.12% of the project total. Boyd County's total 2024 valuation was $702,376,154. The 2025-2026 budget is anticipated to be similar.

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 Upper Elkhorn and Lower Niobrara NRDs have the local jurisdiction to support sustainable water use, as identified in these plans:

- Voluntary Integrated Management Plan (V-IMP): The Upper Elkhorn and the Lower Niobrara each have a V-IMP. Each district's plans have goals that benefit from this project, listed below:
    - Upper Elkhorn NRD V-IMP Goals:
        - Goal 1: Understand water supplies and uses within the District.
            - 1.1: Develop and maintain a database of water supplies and uses within the District.
            - 1.2: Evaluate variability in water supply and uses.
        - Goal 2: Prevent or mitigate water related conflicts within the District.
    - Lower Niobrara NRD V-IMP Goals:
        - Goal 1: To develop and implement processes for the adequate collection of hydrologic and other related data to assess water resources within the District.
            - 1.1: To conduct data collection and analyses of water supplies and demands, utilizing the best available information, data, and science
            - 1.2: To conduct studies to identify hydrologically distinct sub-areas within the District for the purposes of integrated management.
            - 1.3: To monitor changes in water uses within the District.

        - Goal 3: To prevent, resolve, and minimize water related conflicts among and between surface water and groundwater users.

    The Upper Elkhorn and Lower Niobrara NRDs worked with the Nebraska Department of Natural Resources to implement a V-IMP for the district effective in 2019 and 2014 respectively. The goals of these plans that are supported by this project can greatly benefit from additional data. Collecting the aerial imagery and mapping the irrigated acres will allow the NRDs to fill data gaps in their current certified irrigation layers. The Upper Elkhorn NRD has been working to certify their irrigated acres since 2011 and is still finding fields where irrigation is occurring that had not been identified in the original county assessor's information. This means the ground was not being taxed as irrigated at that time and there were gaps in the county assessor data utilized.

- Groundwater Management Plan: The Upper Elkhorn and the Lower Niobrara NRDs have developed a Groundwater Management Plan. While the details for each plan are unique to the district's specific needs and concerns, the idea of both plans is similar and covers a wide range of groundwater needs; below is the overall goal of the Upper Elkhorn NRD's Groundwater Management Plan:
    - The Groundwater Reservoir Life Goal for the Upper Elkhorn Natural Resources District is to protect the quality and quantity of groundwater, and to support reasonable and beneficial uses of the District's groundwater for an infinite period of time.

    The Groundwater Management Plans benefit from this project through the improvement of data resources. Having the higher resolution aerial that previously available and a mapped irrigation layer can improve the ability of the districts to project groundwater as a resource in both quality and quantity aspects. It allows the district to have an improved knowledge of water use locations, identifying where overuse or contamination could be occurring.

- Lower Platte River Basin Coalition Basinwide Water Management Plan: The Upper Elkhorn NRD is one of 7 NRDs working with the Nebraska Department of Natural Resources in the Lower Platte River Basin Coalition (LPRBC). The Coalition developed a plan with these goals that benefit from this project:
    - Goal 1. Develop and maintain a water supply and use inventory based on the best available data and analysis.
    - Goal 2. Implement a water management plan for the Basin that maintains a balance between current and future water supplies and demands.
    - Goal 3. Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

The LPRBC works to keep sustainable flow in the Lower Platte River Basin. To do this the coalition members have come together and develop a plan and allocations for a maximum amount of new development that can be implemented over a designated time period, called an increment. The increments are five years and the allotted amount of acre feet available to each member is dependent upon their information including their irrigated acres. This project would allow for a more accurate dataset for the Upper Elkhorn, which would improve the numbers included in the modeling for the district; not only providing a better number for the district, but a better representation throughout the whole Lower Platte River Basin.

The project impact would be the whole project area of 5,693 square miles or 3,643,520 acres in size. The high-resolution imagery collection will cover the entire district area for both Upper Elkhorn and Lower Niobrara NRDs providing improved aerial imagery for the NRDs and partner counties to utilize when working on projects within the areas. The counties, for example, can utilize the data to identify changes to agricultural properties; new out buildings that have gone up or been taken down, crop ground changes, irrigation changes, etc. Tying this information together with the mapped irrigated acres could have agricultural benefits for the NRDs. It would allow the NRDs to identify where all groundwater and surface water irrigation is taking place throughout the district. Knowing where current uses are, the NRD can utilize this information to make informed decisions regarding regulation changes and any potential future uses. Future use potential depends on how sustainable the new use would be in the environment, if it is known from the aerial imagery and the irrigation layer there is too much stress in an area to sustain additional uses than the information can be shared, and new locations can potentially be identified. This would not only benefit the agricultural field, but it could be utilized for industry, residential, or recreational – all areas that could cause a strain on the sustainability of water use in an area if the current uses aren’t known.

The stakeholders in this project are the partners: Upper Elkhorn NRD, Lower Niobrara NRD, Holt County, and Boyd County; they will benefit from the new information gathered in the project and will be able to improve their data. Those that benefit from this project include the local population of the districts and counties, statewide agencies whose datasets will be improved with the addition of the new data, and regional groups. The data collected through this project can be utilized at every level and benefits expand farther than the project area boundaries.

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 Aerial Imagery Project will help address the recently increased need to identify the location of where irrigation is occurring across the state, which is the building block for multiple water use projects. In the past few years, the Nebraska Department of Natural Resources (DNR) has started reaching out to the NRDs and developing a statewide irrigation layer. What the NRDs have been submitting have been based on what acres that have been certified by producers and have been subject to producer cooperation and the irrigated fields the NRDs were aware of from the information the counties had. Since this isn't a complete dataset there are holes or gaps in what is being provided to the state and then utilized by the state agencies. Having the mapped irrigation layer would greatly improve the irrigation layer the NRDs would have available to submit, which would provide a more accurate layer for anyone who utilizes the DNR irrigation layer. The layer not only includes the areas being irrigated but also a count of acres in each field location on the number of acres; this would greatly improve what the NRD has to offer the state. The project would benefit the whole project area of 5,693 square miles or 3,643,520 acres plus any additional acres for projects completed at a state or regional level. An additional benefit, beyond the improved mapped irrigation layer to the state would be the high-resolution aerial imagery. The imagery can be utilized in water quality or quantity projects to identify irrigated areas, where potential water use issues could occur, as a basis for identify locations for water use research projects, etc. The local NRDs and county offices will benefit from the data collection, but so will the state and larger agencies who work with the NRDs on projects.

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 Aerial Imagery Project is a joint effort between the Upper Elkhorn NRD and the Lower Niobrara NRD with additional funding provided by Holt County and Boyd County. The table below breaks down the funding contributions from each partner if WSF funding is made available. The letters of support provided by the Holt and Boyd County partners are attached.

Partners	**Contribution**	**Percent**
Upper Elkhorn NRD	$31,211.50	17.46%
Lower Niobrara NRD	$28,280.10	15.82%
Holt County	$10,000.00	5.60%
Boyd County	$2,000.00	1.12%
Water Sustainability Fund	$107,237.40	60.00%
TOTAL	**$178,729.00**	**100.00%**

The timeline includes 2025 dates based on quotes provided by the contractor, however if based on the WSF Grant funding timeline the flights need to be flown in 2026, a similar timeline is projected with any cost differences being assumed by the partners.

The funding for the project is budgeted for by the partners, however if funding were to fall through from the partners, the remaining partners would regroup on how to split the funding. If the WSF grant funds were not available, the partners would have to determine if the project would be able to continue as planned or if it would have to be deferred until funding could be secured.

14. Contributes to watershed health and function;

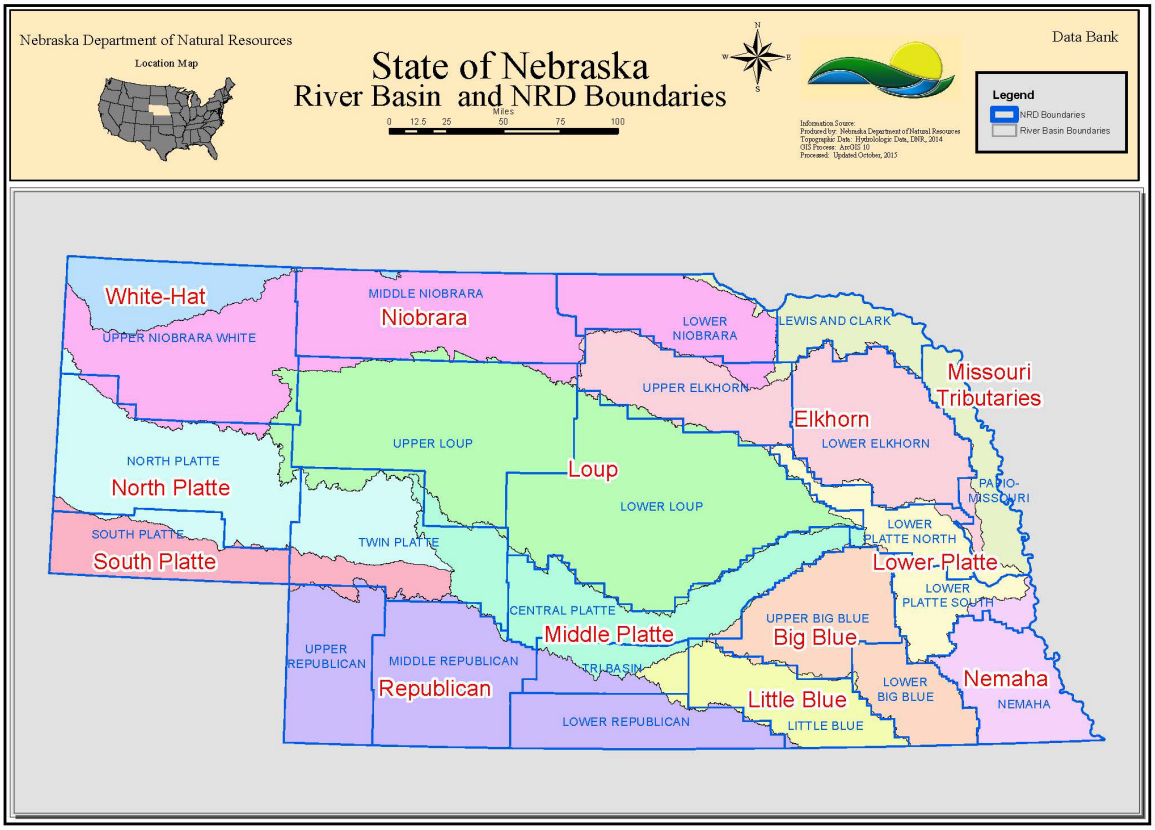
- Describe how the project will contribute to watershed health and function in detail and list all of the watersheds affected.

The watersheds the project area, the NRDs are a part of are: Niobrara River, Elkhorn River, and the Missouri Tributaries Watersheds at the most recognized level in Nebraska as shown by the DNR map below. At a larger level, for example, the Elkhorn River portion of the Upper Elkhorn NRD is part of the Lower Platte River Basin in the second map below. No matter the size of the watershed, they will all benefit from the project by increased precision in existing data and filling of the data gaps. There is work occurring in all the basins currently that will benefit from the more detailed data the project can provide compared to current data. A couple of basin examples are explained below:

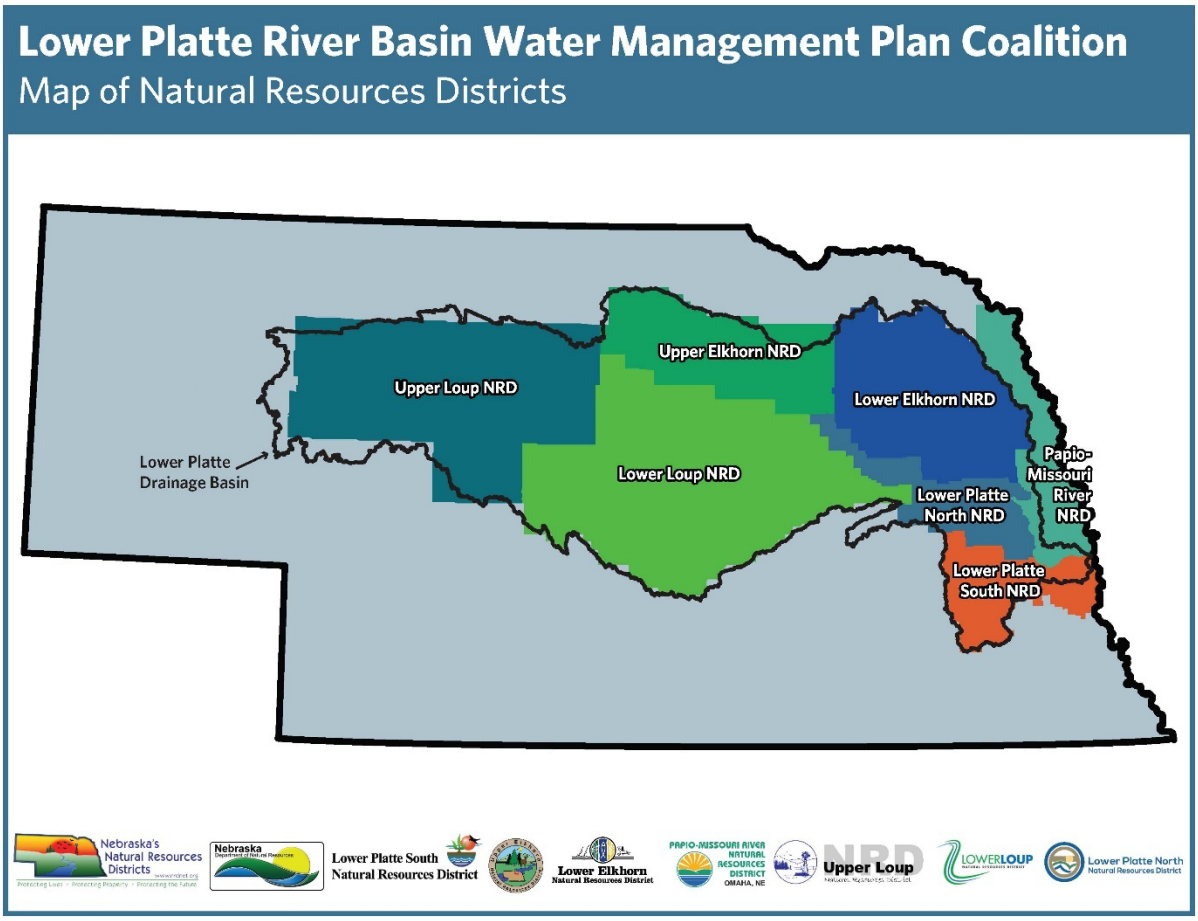
- In the Niobrara River Basin, which both districts have a portion of, the water uses and amount of water used affects if the basin would ever become fully appropriated. The Niobrara River Basin Alliance (NRBA) which both NRDs are members of is focused on working together to ensure the long-term sustainability of sufficient water in the Niobrara River basin to safeguard

future economic activity, agriculture, other water users, fish and wildlife, and recreation activities along the Niobrara River for generations to come. Having the improved dataset to include in any appropriation discussions and future modeling endeavors could make a difference in the evaluation of the River.

- In the Lower Platte River Basin (LPRB), the Lower Platte River Basin Coalition (LPRBC), of which the Upper Elkhorn NRD is a member, the coalition is working to maintain streamflow in the Lower Platte River. To do this the group has developed a basin wide plan that allocates over 5-year increments how much additional acre feet of depletion each district can safely add to their part of the systems with limited effects to the river. The values are calculated through a model and the inputs include the certified acres in each district. This project would fill the gaps in the UENRD irrigated data to provide a more accurate model and allocation number for both the UENRD and the basin as a whole.



State of Nebraska River Basin and NRD Boundaries from Nebraska Department of Natural Resources.



Lower Platte River Basin from the Lower Platte River Basin Plan.

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 Annual Report and Plan of Work for the State Water Planning and Review Process utilized was dated September 2020. The objectives and how the Aerial Imagery Project meets the objectives are listed below:

1. Maintain data, information, and analysis capabilities for water planning, including specific programs for collecting, maintaining, and distributing information on streamflows, as well as analyzing water uses and water supplies across the state;

   The project will provide a more accurate and precise dataset for the Upper Elkhorn and the Lower Niobrara NRDs on where irrigation is occurring withing

the districts. Knowing where all the irrigation is occurring the number of acres the irrigation is being applied to will increase the quality of the dataset. The information collected in this project can be utilized to understand how streamflow is affected by irrigation, and what water uses are being utilized across the districts.

2. Provide staff and resources to support planning and implementation of water resources projects;

   The Aerial Imagery Project increases the information available to NRD staff on the irrigation occurring in the NRDs; it updates any current information we have with higher resolution imagery and fills in data gaps where it wasn't previously known that irrigation was occurring. The mapped irrigation layer will have multiple uses for water resources projects including the identification of all locations of groundwater and surface water uses for irrigation. This information can be included as a layer in modeling efforts done locally, at the state level, or at regional levels.

3. Support locally developed water management plans for conjunctively managing hydrologically connected groundwater and surface water supplies;

   The Aerial Imagery Project supports the Voluntary Integrated Management Plans (V-IMP) that Upper Elkhorn and Lower Niobrara NRDs maintain with the Nebraska Department of Natural Resources. Goals in both of these plans include understanding the water supplies of the district; this includes both groundwater and surface water. Each plan also has a goal to prevent or mitigate water related conflicts with surface and groundwater users. Having the data collected from this project will support the goals of the V-IMPs in management of surface and groundwater together.

4. Provide resources to map and identify areas vulnerable to flood damage;

   The high-resolution aerial imagery and the mapped irrigation areas will be delivered to the partners in a way that can be integrated with other information to identify areas vulnerable to flooding. The aerial imagery will provide a snapshot of the season, whether it's a dry or wet year, giving the partners an idea of where water could be likely to move in a flood. The irrigation layer may also provide some information on flood vulnerability based on irrigated land being disturbed. Disturbed land may not have the protection to erosion and flooding that undisturbed ground does.

5. Participate in interagency collaboration with federal agencies, state agencies, local natural resources districts (NRDs), and other water interest entities on various water resources programs and projects; and

The Aerial Imagery Project is a collaboration between two NRDs initially. However, the data collected can be utilized in projects where the partner NRDs are also collaborating with others. The Niobrara River Basin Alliance, which both NRDs are a part of includes 5 total NRDs working together on water issues in the Niobrara River Basin. The Lower Platte River Basin Coalition is another group the Upper Elkhorn is a part of. This group involves 7 NRD and the Department of Natural Resources working together to maintain streamflow in the Lower Platte River Basin. The information collected by this project would be utilized in the modeling completed for every increment to see what allowable acres each member has allotted for the next increment.

The information will also be shared with the Department of Natural Resources to update their irrigated acre database, which the NRDs submit acres to each year. The project will provide a more accurate number of acres irrigated in each district to part of the statewide dataset. This dataset can then be utilized in many different programs and projects throughout the state by the state agencies.

6. Consolidate and present information in a form that is understandable and useful to the public and interagency collaborators.

   The data collected in the Aerial Imagery Project will have two deliverables, the aerial imagery and the mapped irrigation layer. All the deliverables will be delivered to the partners in formats that are sharable. The aerial imagery, although because of the near-infrared data collection will have different colors, will be user friendly and function similar to lower resolution aerial imagery the public would be used to maneuvering around. The irrigation layer will be delivered as a shapefile for Geographic Information System (GIS) programs that agencies will be able to utilize along with any public who has training.

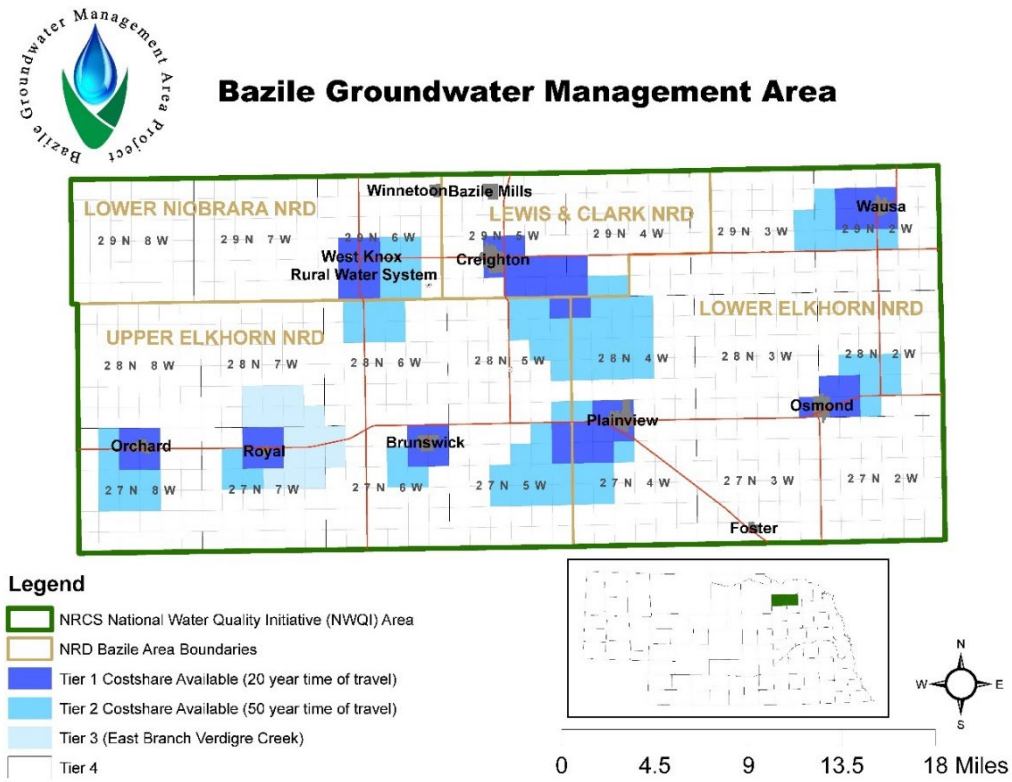
16. Federal Mandate Bonus. If you believe that your project is designed to meet the requirements of a federal mandate which furthers the goals of the WSF, then:

    - 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.

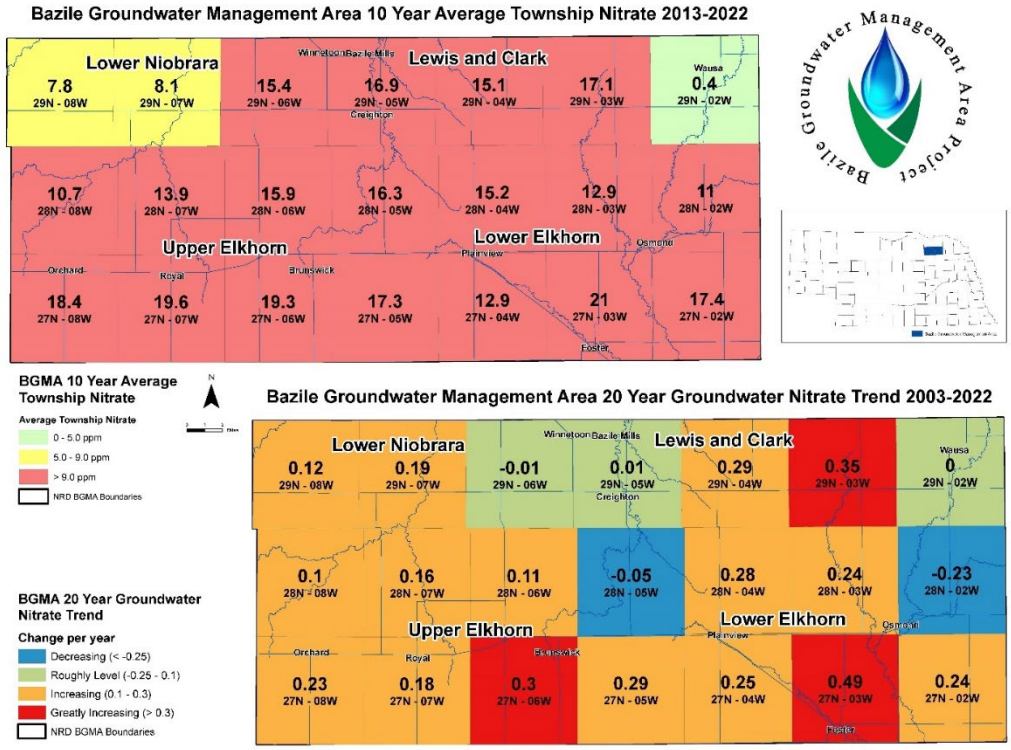
    Congress created the National Wild and Scenic Rivers System in 1968 (Public Law 90-542;16 U.S.C. 1271 et seq.) to protect rivers with outstandingly remarkable values (ORVs) in a free-flowing condition for the enjoyment of present and future generations. The NPS manages and provides guidance on

rivers that are administered by a variety of different parties and works closely with many partners to protect and enhance the Wild and Scenic Rivers placed under its care (National Parks Service, nps.gov). The Niobrara River has been designated as a National Wild and Scenic River along with a recreational designation in the lowest portion of the river which would be in the Lower Niobrara District. This project would work with the federal designation of the Wild and Scenic River to help protect it for the future by identifying current uses. The aerial imagery will provide high resolution data of the designated portion of the river. The mapped irrigated acres will allow for increased data accuracy of the uses of surface water and groundwater along the banks of the Niobrara River and surrounding areas. Identifying current uses and the effects to the stream flow of the river would help in determining sustainability of additional uses or users.

A portion of the project area is included in the Bazile Groundwater Management Area (BGMA). The BGMA is a federally recognized groundwater management area, funded by a 319 grant from the Environmental Protection Agency (EPA) to address elevated groundwater nitrate. The BGMA was originally identified as the Bazile Triangle area of concern in the late 1980s because of nitrate contamination affecting municipal wells in the vicinity of the Villages of Winnetoon, Brunswick, Creighton, Orchard, Osmond, Plainview, Royal, and Wausa, Nebraska. The area was later expanded to the current BGMA, which covers 21 townships, or 756 square miles. A map of the BGMA and the elevated nitrate levels in the BGMA are both included below. Eleven of the 21 townships are included in the aerial imagery project area: 8 in the Upper Elkhorn NRD and 3 in the Lower Niobrara NRD. Upper Elkhorn and Lower Niobrara NRDs are 2 of 4 NRDs that are a part of the BGMA steering committee working with the Nebraska Department of Environment and Energy and agency partners to implement changes to reduce the amount of new nitrate leaching and educate the public about the current nitrate issue. Identifying the locations of all of the irrigated acres within the BGMA will assist the districts and the BGMA in identifying potential sources of nitrate contamination. While there are multiple sources of nitrate contamination, studies conducted by the University of Nebraska in the BGMA have identified commercial fertilizer as the main source of nitrate in groundwater. This project can identify the location and provide the districts and the BGMA group with more accurate data in where the irrigated fields are located to use in relation to the nitrate contamination issues.



Bazile Groundwater Management Area and NRD Boundaries.



Bazile Groundwater Management Area Nitrate Data.