

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Nemaha Natural Resources District Airborne Electromagnetic Hydrogeologic (AEM) Mapping

SPONSOR'S PRIMARY CONTACT INFORMATION

Sponsor Business Name: Nemaha Natural Resources District

Sponsor Contact's Name: Chuck Wingert

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

Sponsor Contact's Phone: (402) 335-3325

Sponsor Contact's Email: cwingert@nemahanrd.org

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

Grant amount requested. \$ 236,100

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

If a loan is requested amount requested. \$

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

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.
- What is the population served by your project?
- Provide a demonstration of need.
- **Do not complete the remainder of the application.**

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

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

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

4. **Partnerships**

List each Partner / Co-sponsor, attach documentation of agreement:
 None

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

NNRD is the lead agency for this proposed Project and application to the WSF (see **Attachment 5** – Letter of Support). The planning and coordination of all flights, data collection, processing, interpretation, and data products will be done using a single geophysical consulting firm (please refer to **Attachment 1** – Proposal Letter). The use of a single Consultant allows the NNRD to share the overhead costs of mobilization and de-mobilization of the data collection equipment, as well as creating efficiency and consistency in data processing and reporting. This shared use reduces the overall costs for all partners. The coordination of last year’s 2018 AEM flight projects (WSF Award #5189) minimized mobilization/de-mobilization and logistical costs for the data collection. This allowed for approximately 200 miles of additional bonus flight lines for the Nemaha Natural Resources District (NNRD). This Project is being completed in cooperation with the Papio-Missouri River NRD with coordinated data collection to improve efficiency and gain economy of scale. After completion of data collection, interpretation, and framework update, information about aquifer characteristics and extents will be provided to the Nebraska Department of Natural Resources (NDNR) for incorporation into existing models as the “best available” information in the FAB Report and Nemaha Numerical Model. This information will also be provided to the University of Nebraska Conservation and Survey Division (CSD), the Eastern Nebraska Water Resources Assessment (ENWRA), the United States Geological Survey (USGS) for incorporation into the Nebraska GeoCloud (WSF Award #4164).

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 estimated at \$393,500 (see **Attachment 1** – Proposal Letter). Nemaha NRD is requesting \$236,100.00 of WSF funding and has confirmed budgeting the required 40% local matching funds from the annual budget process with the understanding/commitment that FY2021 (and/or FY2022, if needed) costs outlined below will be budgeted also. If WSF funding is not obtained, the NNRD will continue to pursue additional AEM flights through ENWRA, and any other grant funding opportunities that might arise.

| Funding Sources | FY20 (30% by March 1, 2020) | FY21 (Next 50% after July 1, 2020) | FY21 or FY22 (Last 20% around one year after flights) | Total |
|---------------------------|-----------------------------|------------------------------------|---|---------------------|
| NNRD NRD | | | | |
| Local Match Subtotal | \$70,830 | \$118,050 | \$47,220 | \$236,100 |
| WSF reimbursements (60%) | \$47,220 | \$78,700 | \$31,480 | \$157,400 |
| Total Project Cost | \$118,050 | \$196,750 | \$78,700 | \$393,500.00 |

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 process of proactively identifying and evaluating water availability through the use of both traditional and state of the art techniques is critical to the state’s water planning activities. Equipped with the best available information, state and local agencies can develop the necessary plans to ensure the sustainability and protection of the state’s water supply. Traditional techniques of aquifer characterization rely upon assessments of subsurface materials from numerous individually drilled borehole locations. The remote sensing technique of AEM has the capability of collecting thousands virtual boreholes at a fraction of the cost of traditional drilling. AEM has been a large part of aquifer characterization in Nebraska with the first data collection project completed in 2007 with subsequent projects approximately every other year since. AEM is combined with existing information about aquifer characteristics to provide an overall three-dimensional framework of the aquifer extents and interactions. Using existing subsurface data from CSD testholes and the NDNR registered well database preserves and expands the usefulness of these traditional methods, assures the best possible fidelity in describing the natural system, and provides comprehensive, up-to-date subsurface hydrogeologic datasets and interpretation products. This Project seeks funding to collect additional AEM data in the Nemaha Natural Resources District and interpret the results into a three-dimensional framework with datasets made available on the Nebraska GeoCloud (WSF#4164).

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):

- 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 will map flight transects and grids across the western portion of the NNRD producing approximately 490 miles of Airborne Electromagnetic (AEM) survey (see **Attachment 2** – Proposed Flight Lines) to extend and supplement the hydrogeologic framework previously developed. The Project activities will consist of the planning of flight lines, contracting with a geophysical equipment vendor, collection of AEM data along the flight lines, processing and quality assurance/quality control of the raw AEM data, interpretation of the processed data, and reporting of the overall results for the NNRD. The deliverables will include a digital pdf report with color appendices depicting individual flight lines in profile view, maps of the aquifer(s), and maps of potential recharge areas for the NNRD. Digital datasets and metadata files produced/incorporated into the survey will also be provided for upload to the Nebraska GeoCloud (WSF Award #4164).

Upon notice of award of the WSF grant, the NNRD will contract with the Consultant to refine the proposed flight lines (see **Attachment 1** – Proposal Letter). Payment of \$118,050 or 30% of the total contract amount will be due at the time of contract signing (anticipated around March 1, 2020). The Consultant, working with NNRD, will develop the final flight lines, maximizing the coverage area while avoiding infrastructure (powerlines, pipelines, etc.) that creates ground interference.

Data collection and processing will occur in the NNRD fiscal year 2021 (between July 1, 2020 and December 31, 2020). Payment of \$196,750 (50% of the total contract amount) will come due on or around the last day of the flight campaign. The report will be completed and will be available in approximately one year from the end of the data collection event (NNRD FY2021 or 2022, depending on the NNRD's approved fiscal budgeting plans). The remaining 20% of the total contract amount, or \$78,700, will be paid out to the Consultant as the individual deliverable and associated digital datasets are completed. Review and use of the data will continue in future years beyond the Project timeline by CSD, United States Geological Survey (USGS), Nebraska Department of Environment and Energy Quality (NDEE), ENWRA, NDNR and the NNRD.

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;
- 1.A.2 Describe the plan of development (004.01 A);
- 1.A.3 Include a description of all field investigations made to substantiate the feasibility report (004.01 B);
- 1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C);
- 1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D);
- 1.A.6 Discuss each component of the final plan (004.01 E);
- 1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1);
- 1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2);
- 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).

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

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

Airborne Electromagnetics (AEM) utilizes a helicopter to carry transmitting and receiving geophysical equipment along a predetermined flight path. In all types of AEM equipment remotely senses the electrical resistivity of the subsurface geologic materials which is then used to interpret the types of subsurface materials that are in place such as clay, silt, sand, or gravel. Electrical resistivity is a measure of how well or poorly the subsurface materials resist the flow of an electrical current. Electrical resistivity when used in conjunction with borehole information and can be correlated with the type of subsurface materials such as gravel, sand, silt, and clay at specific depths below land surface. Highly resistive materials are typically sand and gravel where less resistive materials typically are silt and clay. This provides a nearly continuous set of subsurface information along the flight lines producing a virtual borehole approximately every 50-75 feet. Due to the aquifer depths and variability of overlying material, Time-Domain Electromagnetics (TDEM) AEM has become the standard for large scale remote sensing of aquifer characteristics in Nebraska. TDEM AEM has been successfully implemented in much of Nebraska with extensive flights across the eastern portion of the state. ENWRA, NDNR, and CSD assisted the local Natural Resources Districts (NRDs) with the funding, data collection, and interpretation as well as testhole drilling to ground truth the interpretations. The results of the AEM projects have also been used by the ENWRA NRDs, CSD and others to better plan and site new testhole and monitoring well locations in more specific, targeted aquifer units saving costs associated with blind drilling in less useful locations. A map of the 2018 ENWRA flight lines flown in NNRD is included as **Attachment 2 – Proposed Flight Lines**. Concerns over groundwater quantity in areas of the NNRD not previously flown requires additional data collection and interpretation of AEM flights (Project). The NNRD AEM data was instrumental in the identification and ranking of locations that would provide the greatest groundwater supply. The previously collected AEM data and interpretations and work done as part of this Project will be utilized by the NNRD to update the District's Groundwater Management Plan (GWMP) rules and regulations.

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

The plan developed for this Project is based on previous AEM geophysical surveys flown within the NNRD and the ENWRA group. ENWRA, a coalition of six Natural Resources Districts (NRDs) including the NNRD, partnered with federal, state and local agencies and experts to develop a three-dimensional hydrogeologic framework and water budget for the glaciated aquifer system of eastern Nebraska.

If funded, the NNRD would hire a geophysical contractor for the following services:

- 1) Review the proposed flight line locations and adjust them as needed to minimize interference from power lines and other infrastructure. Preliminary flight line locations, spacing and distances have been estimated for the Project area. (see **Attachment 2 – Proposed Flight Lines**.)
- 2) Selection of the appropriate AEM method, equipment, subcontractors and schedule and contract with the appropriate geophysical vendor

- 3) Oversee and coordinate the survey activities
- 4) Collect and quality check the airborne data
- 5) Process, analyze and interpret the data
- 6) Gather and georeference all existing geologic data near the flight lines
- 7) Interpret the data into a final report taking into account reconnaissance and the one-mile grid frameworks of the 2014-2015 and 2018 NNRD AEM flights. (<http://enwra.org/>). Included with the final report are Google Earth files that can be readily shared with interested parties to assist landowners, well drillers, and local agencies with decisions regarding groundwater resources.

The resulting datasets will be used by the NNRD for insight on groundwater management concerns specific to their District, such as: potential re-evaluation of management area boundaries/rules, positioning network monitoring/observation well locations and/or screen intervals, evaluation of recharge areas, updates and/or refinements to areas of hydrologically connected groundwater and surface water, and groundwater modeling projects in progress/planned. Additionally, results will be provided to ENWRA, the Nebraska GeoCloud Project (WSF Award# 4164), CSD, USGS, NDEE, NDNR and the general public for collaboration and shared use of the best available comprehensive hydrogeologic framework data for the area. The AEM data is considered long term “legacy” data such as borehole records are in the NDNR and CSD databases. It can be used well into the future due to its unique nature and validation of its metadata including the following datasets: raw data, inversion data and interpretation.

It is important to note that Project work related to 80% of the \$236,100 total asking from WSF for this Project will be completed by the end of the flight campaign (\$188,880 in state dollars spent by fall 2020-time frame). The Project will provide the completion of the one mile hydrogeologic framework grid of the major groundwater paleochannel that exists in western part of the District and coverage of several Wellhead Protection Areas (WHPAs). Please refer to **Attachment 2 – Proposed Flight Lines** for a map of the approximate 490 miles of anticipated flights.

Accomplishment of this Project will fill in most grid gaps left for the NNRD as well as provide a greater understanding for re-delineating several public water supplier’s WHPAs. Most of the expensive regional-scale NNRD framework needs will be satisfied with this Project effort. The accomplishment of this Project will greatly enhance the management and sustainability of groundwater resources for the Nemaha basin.

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

NNRD started research activities through its participation with ENWRA in 2007 with three pilot study sites: Oakland, Ashland and Firth (the southern half of the Firth block is in the NNRD) employing a variety of assessment tools including AEM. This was the first of its kind to be used in Nebraska (see <http://enwra.org/> website for the history of airborne applications and results). AEM has been proven over the past 10 years to be a crucial, non-invasive method in acquiring large amounts of detailed hydrogeologic information in a relatively short amount of time and in a cost-effective manner for the amount of area covered. Additionally, Nebraska has become one of the international leaders in coordinated use of AEM for groundwater management purposes with over 20,000 line miles flown in approximately 15 of Nebraska's 23 NRDs (see 2007-2018 flights found at <http://enwra.org/> and AEM related WSF Awards: #4132, 4133, 4134, 4140, 4141, 4142, 4143, 4144, 4164 and 5189). The map included as **Attachment 2 – Proposed Flight Lines** depicts NNRD's 2007 to 2018 flights (green lines) and approximately 490 miles of planned AEM flights for this Project (blue lines).

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

No water or land rights are required to complete this Project. No trespassing on private property or impacts to human health will result from data collection and all data is collected under Federal Aviation Administration rules and procedures. Remote sensing of aquifer materials requires some ground truthing of the aquifer characteristics through traditional drilling and sampling techniques. Flight lines for this Project will be developed to make use of the existing CSD testholes as well as the geologic logs from DNR's registered well database. Where testholes are not available but the need for ground truth locations is critical, additional testholes and associated monitoring wells may be advanced for detailed geologic/downhole geophysics and to identify groundwater quantity and quality. Planning, securing access and implementation of those activities will be conducted separately, subsequent to the Project. The collected AEM data will allow for optimization of the locations of any critical testhole needs allowing for efficient use of testhole drilling expenditures. Should testholes be required, access agreements with landowners will be needed. Testhole drilling requires the use of a drilling rig on location for approximately one to three days to drill and describe the geologic materials. Access agreements from landowners for this type of work typically are readily obtainable as there are limited impacts to the land surface and the landowners typically benefit from the findings.

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 AEM results provided by the contractor include Google Earth layer deliverables with information dots every ~50-75 feet along each flight line. The dots are linked to corresponding interpreted profile image files broken into

approximate 5 to 10-mile sections with legal description track maps shown at the top (see **Attachment 3** – Inversion Interpretation and/or <http://enwra.org/> 2018 AEM website tab for interactive NNRD flight examples). This publicly available dataset can influence future well siting for any well type for any beneficial use. As with past surveys, many private landowners have inquired to NNRD regarding AEM results on their property and are provided specific printouts of the available information to the potential resource under their land (see example **Attachment 2** – Proposed Flight Lines). Private landowners can use the new information to identify suitable areas to construct a domestic, livestock, or irrigation well, especially in areas where water resources are highly variable and/or limited, saving time and money in testhole drilling and other development costs. The NRDs can, and have used, the survey data to evaluate subsurface characteristics in times of well interference to better understand the impacted groundwater formations. Surveys have also been used by CSD and NRDs to work with communities with public supply wells under Administrative Order (AO) from the Nebraska Department of Health and Human Services (DHHS) to evaluate siting potential for new wells. Additionally, many of the proposed flights are over local communities' WHPAs, potentially leading to future adjustments to the boundaries, siting of new public wells in better locations/depths and/or target areas most susceptible to water quality impairments. The data will also be used to help landowners and the NRD to narrow down areas where irrigation development is appropriate and help avoid well interference issues. Use of the data will also allow for selection of areas within the NRD for managed aquifer recharge projects to increase groundwater supplies and associated surface water objectives.

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.

Traditional methods of collecting hydrogeologic information are through the drilling of testholes and logging of the geologic materials found. Individual testholes provide a single point of information about the area's hydrogeology and the materials between testholes, typically over several miles, are inferred. The aquifer materials and their properties may change dramatically in as little as a few tens of feet from the individual testhole and provide limited information about the broader aquifer characteristics. While limited, testholes have been the best available method for assessing aquifer characteristics until the recent employment of AEM. AEM essentially provides virtual testholes along a flight path, thereby collecting a nearly continuous cross-section of the aquifer materials. This type of seamless cross-section cannot feasibly be collected through any other known method. As a generic example, it would cost around \$990,000 (\$10 per foot of drilling, not accounting for geologist time) to produce a typical cross section along a 10-mile

line using approximately 330 testholes spaced every 160 feet (drilled to typical depths of around 300 feet). Drilling 330 testholes would certainly require months if not years of intensive effort. The AEM proposed herein will provide virtual borehole soundings about every 20 feet with x, y, z axis data lumped every 70 feet to depths around 500 feet. The \$990,000 required for traditional testhole drilling and logging can be compared to a 10-mile AEM flight line at approximately \$8,030 (\$803.6/mile) as planned with this Project, or less than 1% of the cost of traditional methods. In addition, the raw data for such a 10-mile AEM flight line can be collected in a matter of hours, and the processing of that data can be accomplished in a few days. For the entire proposed Project area, it would likely take decades to complete the 490 miles of cross sections through the use of testhole drilling and logging of geologic materials, compared to two years anticipated for the proposed AEM flights and reporting. In summary, using this example, the traditional testhole boring method would cost over \$48½ million compared with the \$393,500 cost of collecting AEM data.

Please refer to <http://enwra.org/> website tabs: “about”, “projects”, “media downloads”, and “AEM” (several tabs) for background on the technology and methods the NRDs have expended to get to the level of this Project request.

3. Document all sources and report all **costs** and **benefit data** using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies is the project life, up to fifty (50) years; or, with prior approval of the Director up to one hundred (100) years, ([Title 261, CH 2 - 005](#)).

Relevant costs will include mobilization of the geophysical equipment and helicopter, flight line planning, data collection and interpretation and the Consultant fee to produce the final report. The cost to collect the remote sensed geophysical data from a helicopter is approximately \$804 per mile and the estimated life of the Project is two years.

Data collection using traditional methods through testhole drilling and logging would amount to approximately \$99,000 per mile and take several decades to complete 490 equivalent miles of data.

- 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](#)).

Relevant costs will include mobilization of the geophysical equipment and helicopter, flight line planning, data collection and interpretation and the

Consultant fee to produce the final report. Two years is the estimated life of the Project.

- 3.B Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe intangible or secondary benefits (if any) separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, in a way that justifies economic feasibility of the project such that the finding can be approved by the Director and the Commission (005.02).

The primary tangible benefits of the AEM are generally the same as for testholes, i.e. data obtained is a record of what geologic materials are present below ground at different depths. However, the outcomes for this Project are enhanced by the existing CSD testholes, NDNR registered well datasets and AEM work done prior to this Project. Advancements in visualization software programs and interpretation methods are combine individual point location data together to produce highly detailed cross-sections and three-dimensional geologic frameworks. The resulting framework can be used in addressing any future hydrogeologic problem or project and will allow all partners and the general public to be more efficient and effective in directing future groundwater-related activities and decisions.

- 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).

| Cost Activity | 30% Down Mar. 1, 2020 | Cost after July 1, 2020 | Report Costs March 1, 2021 | Cost TOTAL | Benefits - potential cost of drilling 16,170 testholes 300ft deep at \$10/ft and processing the data to produce aquifer boundary maps (160 ft hole spacing along 490 mi of planned flight lines) |
|---------------|-----------------------|-------------------------|----------------------------|------------------|--|
| WSF Grant | \$70,830 | \$118,050 | \$47,220 | \$236,100 | Testhole drilling \$48,510,000 plus incalculable CSD/NNRD time |
| Local Match | \$47,220 | \$78,700 | \$31,480 | \$157,400 | |
| CSD | | | | In-kind | |
| NNRD | | | | In-kind | |
| TOTALS | | | | \$393,500 | |

*CSD commonly uses \$6 per foot as an in-kind value for one geologist's time (expertise rate commonly used in grant applications additional to drilling costs) it would take over 350 years for two full time employees to complete the testhole processing/cross-section work (annual salaries of \$75k, totaling about \$58 Million).

- 3.D In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.)

This Project will collect information necessary to assist the NNRD Board with decisions regarding the conservation and protection of the groundwater resources. Those decisions may result in the establishment of elevated regulations through Groundwater Management Areas for either quantity or quality, the prioritization of Wellhead Protection Plans and other programs sponsored by the NNRD for aquifer protection. Since the program, project, or action that may result from the information is not yet known, there is not currently a method for calculating the primary tangible benefits of the Project in a quantitative way. While quantifying the benefits from the Project is not a possibility, there is an ability to discuss the overall benefits from a qualitative standpoint. The purpose of the mapping through AEM is to identify and define the relationship of the aquifer systems to one another as well as to the land surface and the surface water systems. The water available for use from an aquifer system is dependent upon the relationships among overall use, recharge, and discharge. The Project will improve the overall identification of confining layers between aquifers thereby improving the understanding of the interrelationships of use, recharge, discharge, and potential contamination threats. This improved understanding will be used to drive management decisions regarding the quantity available of various groundwater demands in the area. The conservation of the groundwater resources would be accomplished with management actions that prioritize use and limit total groundwater withdrawals as and where needed. Relationships among groundwater use, recharge, and discharge also informs potential actions related to groundwater quality. Tailoring the locations of groundwater use decreases the potential need for expensive treatment and improves the longevity of capital investments related to water supply. Additionally, the understanding of where the groundwater resources are most susceptible from surface contaminants can be used to tailor the approaches to groundwater management activities. This greater understanding of the groundwater/surface water interaction reduces the need for additional, expensive testhole drilling by those looking to utilize the resource as well as preventing undue regulation resulting from a lack of knowledge of the resource. The Project improves the NNRDs ability to provide tailored approaches to management to ensure the long-term conservation and protection of the water resources. These tailored approaches can assist the users of the water resources with understanding their capacity for continued development and protect existing and future development. One form of benefit from this Project could be realized by the ability to avoid constructing replacement wells impacted by the migration of high nitrates. Mapping through the AEM process will also give the NNRD a better understanding of potential cross contamination threats of multiple aquifers.

Further benefits are realized from the public use of the data and enhanced management of the quality and quantity of groundwater.

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. Natural Resources Districts (NRDs) are granted the authority to impose property tax levies to generate revenue for operational needs.

The 2018 funding levies listed below for the Nemaha NRD will provide sufficient funds to provide the cash contribution necessary to complete this Project. Additionally, the NNRD has planned to budget matching funds for this Project in their annual fiscal year (FY) FY2020 and 2021 budgets (finalized after July 1 each year)

| Local Sponsors | Cents per \$100 Assessed Valuation | 2018 Property Tax Revenue | 2018 Total Budget |
|--------------------------------|------------------------------------|---------------------------|-------------------|
| Nemaha NRD (\$393,500 project) | 2.67 | \$1,964,975 | \$5,686,379 |

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

The extended cost to operate and maintain the work achieved is covered in the annual NNRD budget. CSD and the USGS have teamed with ENWRA to create the Nebraska GeoCloud to house all the AEM data statewide and provide long-term data visualization, management, and sharing capabilities (WSF Award# 4164). Because the Project is primarily data collection, there is no cost associated with equipment replacement, just annual Nebraska GeoCloud costs which are currently local match-funded under a 10-NRD interlocal agreement (eastern and western Nebraska NRDs). Additionally, anticipated annual costs of \$25,000 per year to maintain the Nebraska GeoCloud are already planned in ENWRA's long range plan budget for data management. (see **Attachment 4** – Project and Objectives Matrix Table – Objective 2E.)

6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.

Not applicable

7. Describe how the plan of development minimizes impacts on the natural environment (i.e. timing vs nesting/migration, etc.).

The AEM survey is conducted in and out of local airports without trespass on private land beneath the flight lines and is conducted according to current FAA rules which minimize disturbance to property owners. The number of holes and observation wells required to define aquifer systems is decreased significantly by the AEM mapping process, thus lowering the degree of impact on the natural environment from drilling rigs and support vehicles.

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

The Nebraska Ground Water Management and Protection Act, passed in 1975, established the NRDs as the preferred local entities for groundwater regulation and protection. NRDs work cooperatively with cities, counties, state, and federal agencies to accomplish groundwater resource protection through programs, projects, and regulations. Each NRD is required to have in place a Groundwater Management Plan (NDRD GWMP 1985), based upon the best available information, and approved by the Director of the NDNR. The District voluntarily entered into an Integrated Management Plan (IMP) development process with NDNR to take a proactive approach to the protection of hydrologically connected surface and groundwater. The staff, management, and Board of Directors (Board) of the NNRD devote significant time and resources toward their duties to understand and manage the groundwater resources. The District's previously collected groundwater data will be combined with the information collected during this Project for future decisions about the management and protection of the groundwater resources.

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

Each of the eastern Nebraska NRDs have been using ENWRA as a vehicle to understand both groundwater and hydrologically connected water, and thus ENWRA's Long Range Plan (LRP) includes AEM mapping and other assessment goals and plans specific to each NRD. Identifying the location and volume of aquifers in the NNRD and other select areas (see **Attachment 4** – Project and Objectives Matrix Table – Objective 2) focuses the refinement of the geologic framework to areas in which there are economic and ecologic returns on the investment. The specific locations listed for the NNRD represent areas in which competition for groundwater is occurring and scientific data to support management decisions is lacking. ENWRA anticipates working on multiple small to mid-sized projects at any given time and the projects will likely have variable scales of resolution, use a variety of geologic and geophysical techniques, and have multiple funding sources. The purpose of the NNRDs participation in ENWRA is to enhance the cost effectiveness and timeliness of these potential

projects through coordination and collaboration. Further, the ENWRA coordinator, as stated in the ENWRA Long Range Plan, will provide coordination services for secondary projects (NRD-specific projects like this one and the associated Nebraska GeoCloud WSF Award# 4164) as long as they further the overall ENWRA goals and objectives. All NRDs are statutorily required to have a completed Groundwater Management Plan (GWMP) which includes information about the aquifers of the NRD, supplemental supplies, integrated and coordinated use, and the boundaries of management areas. The Nemaha NRD has an adopted GWMP and results of this Project specifically meet the objectives of the GWMP to increase the NRDs' general knowledge of the hydrogeologic characteristics in the District, and to preserve and conserve groundwater quality and quantity. Further, the Nemaha NRD has initiated the Integrated Management Plan (IMP) process with the NDNR in 2017. NNRD took action on March 9, 2017 to begin the development of a voluntary IMP. Additional AEM data will provide valuable information to support that individual plan. The Nemaha NRD's existing groundwater data will be combined by the staff and management with the information collected during this Project. The NNRD Board will utilize the full set of information regarding the groundwater resources obtained from AEM to inform the IMP development process and for future decisions about the management and protection of the groundwater resources. NNRD will work through the Nebraska GeoCloud (WSF Award# 4164) and continue to coordinate with ENWRA's eastern Nebraska hydrogeological assessment work (<http://enwra.org/>). The data collected by the Project will also be submitted to the NDNR as the "best available" information for use in the Annual Evaluation of Availability of Hydrologically Connected Water Supplies, hereafter referred to as the FAB Report. The FAB Report is a statutory requirement of the NDNR which evaluates the long-term availability of the hydrologically connected water supplies of the state. The previous collection of AEM data completed by NNRD was partially funded by the NDNR for use in their modeling efforts to determine the impacts of groundwater use on surface water availability in hydrologically connected reaches. The results of those modeling efforts (Nemaha Numerical Model), when complete, will be incorporated into the FAB Report which determines if a basin is fully appropriated or not. The Project will update the overall hydrogeologic framework and improve upon the previous AEM work that supports the FAB Report.

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.

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

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

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

The NNRD, as a political subdivision, has the authority to undertake the Project because the purpose of the Project relates directly to the development, management, utilization, and conservation of groundwater and surface water as designated in Nebraska State Statute Chapter 2 Article 32. Further authority of the NRDs are defined under the Nebraska Groundwater Management and Protection Act Chapter 46 Article 7, to enter into contracts or agreement, budget and expend levied property taxes, own and operate property and equipment, and conduct investigations relative to the protection and management of groundwater.

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

There are several positive environmental/ecological impacts provided by an improved understanding of the groundwater resources of the region. The knowledge will lead to improved management of the resources for water quality and quantity. Identifying areas of ground and surface water connection and better defining the presence, extent and volume of specific paleovalley aquifers (where flight line spacing provides sufficient resolution) will likely alter the current management methods in those areas, thus promoting more sustainable, wiser use of the resources. Since all the data will be collected by air flights, no damage will occur to the ecosystems such as wetlands, nesting habitat, forest areas etc. Collecting data by traditional on ground methods like drilling can result in some impacts to the ecosystem because of equipment and vehicle use. AEM dataset coverage can reduce the number of testholes required with exploratory drilling, making the Project more of an environmental/ecological benefit than a consequence.

Section C.

NRC SCORING

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

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

Notes:

- The responses to one criterion will not be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.
- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criterion 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. Remediate or mitigates threats to drinking water;
 - Describe the specific threats to drinking water the project will address.
 - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
 - Provide a history of issues and tried solutions.
 - Provide detail regarding long-range impacts if issues are not resolved.

The proposed Project area includes parts of Johnson, Otoe, Lancaster and Gage Counties. Annual water quality sampling of domestic and irrigation wells indicates areas with low nitrate-nitrogen concentrations and other areas

with nitrate-nitrogen concentrations at or above the Environmental Protection Agencies (EPA) maximum contaminant level (MCL) of 10 parts per million (ppm). Potential mitigating actions which may occur as a result of the annual study include deeper domestic well construction, future well construction modification, enhanced groundwater recharge information and management, and improved water quality monitoring. Detailed information collected from AEM combined with traditional hydrogeologic information that is incorporated into an aquifer framework provides a better understanding of the physical extents and potential interactions of the local and regional aquifers and surface waters. A hydrogeologic framework includes not only the depth to the top of the aquifer and extents of the aquifer materials but also the depth to the bottom of the aquifer. An aquifer's susceptibility to surface contaminants is partially determined by the type of overlying materials and the materials percolation rate to recharge the aquifer or not. Sandier materials above an aquifer with limited clay content allow more rapid recharge, whereas thick sections of clay reduce the rate of percolation and recharge. This information will be a product of the data collected along the flight lines. Additional sources of information about the overlying materials, such as soils maps, only include the very near surface materials. The standard soil mapping practices typically only sample the soil every 2.5 acres versus the data rich sampling done with the virtual boreholes of AEM. AEM provides information about the full sequence of material that overlays an aquifer. Greater understanding of the extents of materials that limit or transmit percolating water can provide NNRD with the ability to tailor management activities intended to protect drinking water quality. Typically, contamination from the land surface tends to remain in the uppermost portion of the aquifer system versus mixing more deeply in the aquifer. Nitrate is a good example as it tends to stratify in the upper aquifer. The mapping of shallow clay zones through AEM helps delineate zones along the flight lines protected from contaminate transport from the surface. Locating future domestic and municipal drinking water supplies in areas where these protected aquifer units exist can help with wellhead protection and limit the impacts of the downward migration of contaminants. Historically, domestic well construction occurred in the uppermost portion of the aquifer once the driller has encountered enough water bearing sands, the drilling was stopped, and the well was completed. Drilling deeper was considered an unnecessary expense however can provide a domestic well with greater longevity and reduced impact from surface contaminants. A deeper drinking water well also reduces the potential interference from nearby wells as the aquifer is drawn down during peak use periods and times of drought. The NNRD has monitored groundwater quantity and quality in the Project area for the past several decades as part of its current GWMP. The NDNR water well registration database indicates there are 322 irrigation wells, 574 domestic wells and 22 public water supply wells from five communities and two rural water Districts serving over 5,000 residents within the 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.

The NNRD developed a voluntary Integrated Management Plan (IMP) with the NDNR in 2017. The overall goals of the NNRD voluntary IMP are to better manage hydrologically connected water and aquifer characteristics that may have an impact on the resource. This Project will address objectives and action items related to these goals by: (1) utilizing the best available data and analysis tools to estimate consumptive water use, (2) assess the need for additional monitoring, (3) continue to gather and analyze hydrogeologic data, and (4) coordinate with public water supplies to enhance education and conservation. In addition to developing the voluntary IMP, the NNRD has an adopted GWMP, last revised in December of 2014. Results of this project meet the objectives of the GWMP to address specific problems of groundwater quality. Groundwater quality monitoring conducted by NNRD staff has shown the northwest portion of Richardson County to have elevated levels of nitrates. This area has been designated a Phase II GWMA for groundwater quality and requires the NNRD to conduct annual sampling of domestic wells. The NNRD also provides cost-share incentives to landowners for closing abandoned wells, soil sampling and fertilizer control systems.

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.

A large portion of the surface and groundwater resource in the NNRD Project area drains directly into the Missouri River. Once in the Missouri River, it is essentially lost to Nebraska for beneficial use. In most areas of the state, water leaving a basin still has the opportunity to be used in the next basin (<https://dnr.nebraska.gov/water-planning/what-statewide-water-planning>), but this is not the case for entire NNRD. Cross basin benefits for the NNRD include improving the ability of groundwater professionals/agencies to delineate aquifer boundaries that may cross the Missouri-River Tributaries basin, Lower Platte River basin and/or NRD watershed boundaries. One of the primary goals/purposes of the 2014/2015 AEM recon lines was to provide a grid-like data set to compare with

NDNR's numerical groundwater model work for the Lower Platte and Missouri River Tributaries (LPMRT) Assessment in eastern Nebraska. The LPMRT Assessment is one of NDNR's current Integrated Management projects and covers the surface area of Nebraska tributaries that drain into the Missouri and Lower Platte Rivers. Following the completion of the LPMRT numerical model, the NDNR plans to produce another numerical model specific to the Nemaha River basin. The proposed Project data, along with existing data that has been collected (NNRD have collected recon level and block level flights between 2007 and 2015), could provide the NDNR with aquifer thickness information for large continuous areas within the Nemaha River basin and along the boundaries of the two basins. This tighter grid spacing would allow for additional model input comparison purposes, thus assisting in the NDNR's annual evaluation of basin water supplies.

The collection of hydrogeologic data, and assembly of that data into an overall aquifer framework, provides the information necessary to help determine recharge characteristics, aquifer extents, volume of available groundwater, interconnection with other aquifers, and stream-aquifer interactions. AEM, along with interpretation of the collected data, provides highly detailed information about the materials within the aquifer as well as the materials above, below, and adjacent to the aquifer. An example of the type of aquifer delineation that AEM can provide is included as **Attachment 3** – Inversion Interpretation. Aquifer recharge is determined by the water available from precipitation for deep percolation after taking into account runoff, evapotranspiration, soil characteristics, and other factors. Recharge is also impacted by the materials that overlay the aquifer which influence the way in which the deeply percolating water reaches the aquifer. Generally speaking, the sandier the materials that overlay the aquifer, the faster the recharge will be, while more clay rich materials will tend to slow the recharge.

AEM can be utilized to improve the NNRD's understanding of recharge potential by delineating the layers of material types overlying an aquifer. Recharge potential can then be utilized by NRDs to better assess projects designed to increase recharge as well as inform NRDs' management of preferred development zones in areas where recharge is higher. Preferred development areas can be used to tailor development of additional uses of groundwater to those areas where recharge more readily replenishes withdrawals, where aquifer thickness is greatest, where effects from aquifer extents are reduced, or where well impacts to streams are minimized. Management decisions for Groundwater Management Areas (GWMAs) would seek to balance the needs for groundwater development with the existing uses of groundwater in an area. A more complete framework of the hydrogeology will improve the NNRD's ability to make those management decisions and improve the sustainability of the overall water resources. Potential management decisions to utilize allocations, water use, rotation, limits on development, well spacing requirements, or other groundwater controls as part of a GWMP or IMP can be better tailored to protect existing users and promote sustainable use of the water resources.

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.

Conservation and preservation of water resources for the beneficial use of the residents of the state requires detailed information about the aquifer characteristics and interactions of the groundwater and surface water resources. Sound strategies for conservation and preservation in this area, whether it be through management actions, programs, or projects, depends on that detailed information to understand the distribution of available groundwater and associated water quality. AEM data collection in the project area will not only benefit residents of southeast Nebraska but also provide invaluable amount of data for current and future studies to better manage and conserve water resources. AEM surveys have greatly advanced groundwater management efforts by providing cost-effective, high-resolution subsurface information that has revolutionized aquifer mapping in Nebraska. In the last 10 years, taxpayers have invested over \$10 million on 15,000 line-miles of AEM collected by different consultants and sponsors using different survey methods, software, and analytical approaches. The Nebraska GeoCloud, a state-wide internet storage network designed specifically for AEM data, was developed in order to permit seamless data integration and sharing of results between collaborating organizations. The AEM data from the project will be added to the Nebraska GeoCloud, making the data readily available in a standardized format to water resource managers, scientists, and planners across the state.

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 use of Nebraska's water resources is established and prioritized in the Nebraska State Statutes with domestic use being the highest priority and agricultural and industrial use following from there. Water is considered a natural want and a correlative resource of the State. The aquifer framework developed through this AEM collection project will further the District's understanding of the aquifer systems and will be shared with other NRDs as well as other agencies

including NDNR, USGS and CSD. The primary impact to beneficial use from the proposed Project is to the protection of groundwater used as a drinking water source from potential contamination. Understanding the susceptibility of the aquifer systems from surface contaminants will allow the NNRD to tailor its approaches to programs, projects, and actions by the NNRD Board to provide greater protection of the water resources. The need for GWMA's, along with best management practices for activities that may contribute surface contaminants to the groundwater, can be readily assessed and implemented.

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.

There are no costs for construction, O/M, etc. for this Project. However, it's important to note that, even though AEM surveys are expensive, the technology provides the equivalent of a detailed geologic cross section for every aerial line flown. Such a result can be obtained in rough form within a few hours, and after data analysis, inversion, etc., the detailed result is produced (along with three-dimensional versions, derived characteristics, etc.) within several months.

Traditional methods of collecting hydrogeologic information are through the drilling of testholes and logging of the geologic materials found. Individual testholes provide a single point of information about the area's hydrogeology and the materials between testholes, typically over several miles, are inferred. The aquifer materials and their properties may change dramatically in as little as a few tens of feet from the individual testhole and provide limited information about the broader aquifer characteristics. While limited, testholes have been the best available method for assessing aquifer characteristics until the recent employment of AEM. AEM essentially provides virtual testholes along a flight path, thereby collecting a nearly continuous cross-section of the aquifer materials. This type of seamless cross-section cannot feasibly be collected through any other known method. As a generic example, it would cost around \$990,000 (\$10 per foot of drilling, not accounting for geologist time) to produce a typical cross section along a 10-mile line using approximately 330 testholes spaced every 160 feet (drilled to typical depths of around 300 feet). Drilling 330 testholes would certainly require months if not years of intensive effort. The AEM proposed herein will provide virtual borehole soundings about every 20 feet with x, y, z axis data lumped every 70 feet to depths around 500 feet. The \$990,000 required for traditional testhole drilling and logging can be compared to a 10-mile AEM flight line at approximately \$8,030 (\$803.6/mile) as planned with this Project, or less than 1% of the cost of traditional methods. In addition, the raw data for such a 10-mile AEM flight line can be collected in a matter of hours, and the processing of that data can be accomplished

in a few days. For the entire proposed Project area, it would likely take decades to complete the 490 miles of cross sections through the use of testhole drilling and logging of geologic materials, compared to two years anticipated for the proposed AEM flights and reporting. In summary, using this example, the traditional testhole boring method would cost over \$48½ million compared with the \$393,500 cost of collecting AEM data. Additionally, there is no CSD staff/equipment available to dedicate to completing this scale of work for the region. For example, if you use a \$12 per foot rate (16,170 holes about 300 feet deep) for two geologists' time (CSD commonly uses \$6 per foot as an in-kind value for one geologist's time in grant applications) it would take over 350 years for two full time employees to complete the work (annual salaries of \$75k, totaling about \$58 Million). Further, the AEM electronic products and deliverables are conducive to incorporation into modern computing and modeling work and already include existing geologic data gathered along the flight lines as compared to manual testhole processing and conversion into electronic format for testholes. Given these points, it's apparent that collection of geologic and groundwater data through AEM will provide almost immediate payback as the data will be available in as little as two years and can be used for the foreseeable future, while collection of such data via traditional methods would take generations, if it would even be possible at all.

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.](#)

Federally endangered species exist within the NNRD basin and are susceptible to its health and function. By better understanding the aquifer resources, the Nemaha NRD can make responsible decisions that will reduce potential negative impacts to its local endangered species. Additionally, information gained from these surveys can benefit Nebraska's drinking water program which has 1,375 public water systems, serving most of its 1.7 million residents (Nebraska Health and Human Services [DHHS] website accessed Dec 2015). Water regulators and managers in compliance with the Safe Drinking Water Act, including the establishment of well-head protection areas, use CSD data for making their decisions. CSD has immediate plans to incorporate the AEM data (Ongoing County Atlas work and Nebraska GeoCloud WSF Award# 4164) into their survey and geologic data integration efforts. Also, the information provided by this Project would assist water managers/regulators with science based information to comply with Nebraska Title 118-Ground Water Quality Standards and Use Classifications, which states "It is the public policy of the State of Nebraska to protect and improve

the quality of groundwater for human consumption, agriculture, industry and other productive, beneficial uses.”

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.

Information resulting from this Project will help protect critical infrastructure, primarily municipal and domestic drinking water wells which serve the communities of NNRD, with an estimated population of 44,560 (2010 US Census). Declining groundwater levels that impact wells often requires well owners to lower their pumps or drill new wells. This data can help protect these drinking water supplies by helping to protect future overuse of the aquifer and reducing the threat of groundwater contamination. Understanding the entire aquifer framework is essential to prevent future drinking water supply contamination and ensuring a reliable public water supply for the future development of this area. Cost savings resulting from the completion of this project are unknown currently however having to construct a new public water supply well due to contamination or depletion can cost hundreds of the thousands of dollars to a municipality or rural water district and their customers.

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.

Groundwater quality in the Project area, specifically nitrate contamination, is higher in part of the Project area as compared to the remainder. Other drinking water users in the Project area are susceptible to the same type of nitrate contamination to varying degrees depending upon the location and depth of the municipal or domestic wells. Where drinking water supplies are impacted, and the owners of those wells are aware of the impacts, costly filtration systems are

needed to remove the contamination. Creation of a hydrogeologic framework that delineates the extents, thickness, and interaction of the area aquifer systems along the flight lines allows the NNRD Board to make science-based decisions regarding the protection of the water resources. Large scale uses, such as agricultural or industrial, have withdrawals that can potentially impact other users. The understanding of the extents and interaction of the aquifer system also allows for science-based decisions for the conservation of the water resources for the long-term beneficial uses of the residents and businesses. While the primary benefit from the Project is an understanding of the water quantity available, the improvement of groundwater quality is also a concern. The NNRD would be able create programs or projects that directly impact water quality from further degradation and protect the health of the residents that are dependent upon the groundwater for their drinking water supply. An estimated 5,000 or more residents get their drinking water from groundwater supplies, municipal or domestic, in the Project area.

Nebraska's Wellhead Protection Program (WHPP) is a voluntary program which assists public water supply systems in preventing contamination of their water supplies through active planning and on the ground practices in conjunction with the Nebraska Department of Environmental & Energy (NDEE) and local NRD. The first step in a WHPP is to delineate a wellhead protection area (WHPA) around a system's wellfield based upon the local hydrogeology entered into a groundwater model. The WHPA model estimates the distance away from a supply well that contamination of the aquifer would take to reach a supply well over a twenty-year period. Typically, there is very little geologic data available for the model besides the geologic logs of the supply well(s) and a handful of other registered wells or CSD testholes. Public water systems are expected to review their WHPP every five years and incorporate any new data into the model. AEM data would greatly improve the input data to model, the accuracy of the groundwater model and the subsequent protection 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 NNRD devotes substantial time and resource to the assessment of the overall water quality of the groundwater resources of the district. This proposed Project was discussed and voted on by the NNRD Board of Directors during the July 11th, 2019 meeting. The motion to pursue resources to proceed with this Project passed unanimously. Past financial input from the NNRD to support these types of projects include annual water quality and quantity monitoring,

installation of monitoring and observation wells, past AEM studies, and partnerships with CSD, NDNR and other local NRDs to collect data of this sort. The total Project costs for this proposed AEM data collection, interpretation and reporting is \$393,500.00. Of that total Project cost, the NNRD will use general funds to cover the required local match of 40%, or \$157,400.00. The remaining \$236,100 of funds needed for the Project are this grant request.

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.

NRDs have the authority under the Nebraska Groundwater Management and Protection Act, Chapter 46 Article 7 regarding groundwater to enter into contracts or agreements, budget and expend levied property taxes, own and operate property and equipment, and conduct investigations relative to the protection and management of groundwater. Nebraska State Statute Chapter 2 Article 32 gives the NRDs authority to carry out projects related to the development, management, utilization and conservation of groundwater and surface water.

The NNRD developed a voluntary IMP with the NDNR in 2017, which establishes measurable goals and targets for managing the District's aquifers. The results of this project will support sustainable water use by creating an aquifer framework to better manage domestic, municipal, agricultural, and industrial water supplies and water quality. Benefits of the project will address the threat of nitrate contamination for an estimated population of around 5,000. Stakeholders involved in the project will include the Board and staff of the NNRD, NDNR, CSD, and local landowners. The NNRD has an adopted GWMP, last revised in 2014. Results of this project specifically meet the objectives of the GWMP to address specific problems of groundwater quality. Groundwater quality monitoring by NNRD staff, as part of the GWMP, has shown a parts of the Project area to have elevated levels of nitrates.

Since May of 2013 the NNRD has applied the following management considerations for sustainable water use:

- Flowmeters have been required on all new or replacement wells that have approved permits for flowrates greater than 50 gpm
- Cost-share provided for flowmeters and soil moisture monitoring equipment

- Developed a well permit scoring system that requires a testhole be submitted along with the application which takes in account aquifer thickness and transmissivity. The density of registered wells within 6,000 feet of a proposed high capacity well is also considered in the permit scoring system.

AEM data helps support the NNRD's evaluation of the testhole data submitted, thickness of the aquifer, and the depth to bedrock.

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.

Groundwater is the primary water supply source in Nebraska. The two primary issues addressed by this Project will be limited groundwater supplies (especially in drought conditions) and groundwater quality degradation due to nitrate-nitrogen and other potential contaminants. These problems are a statewide occurrence in Nebraska but are particularly magnified in the Project area due to the variable and limited nature of the aquifers occurring in the eastern glaciated portion of the state. The NNRD represents 2.44% of the state's 1.9 million residents and has a diverse group of drinking water users: municipalities, small and mid-size communities and towns, eight rural water systems, and high densities of rural domestic users. This Project will assist entities and individuals in maximizing current groundwater conservation and management efforts, as well as helping them identify potential new well locations should the need occur.

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 primary leverage for this Project will be to benefit local public water suppliers and domestic well owners. As described, the detailed AEM results will be highly valuable to local suppliers in managing existing, limited groundwater supplies, as

well as identifying new well locations should that become necessary. Public water suppliers make use of a variety of funding sources (for example, the State Revolving Fund and USDA Rural Development) when upgrading or installing new water or wastewater systems. The information on groundwater occurrence, as well as near surface geology, will prove highly valuable when evaluating new facility sites. The refined aquifer volume estimates will help facilitate required aquifer analysis for establishment of new groundwater-based drinking water systems.

The Project also builds on previous state dollar investments as it is considered a follow-up, expansion, fill-in of additional data piloted by NNRD's initial AEM efforts and AEM reconnaissance line efforts. NDNR was a funding partner on AEM data collection through ENWRA in 2007 with the ENWRA pilot projects (NDNR IWMPP Contracts #294 and #359) and reconnaissance flights in 2014 and 2015 (NDNR Contract #789), and is working on groundwater numerical models for eastern parts of Nebraska to evaluate comparisons of outputs using AEM results (LPMRT & Nemaha numerical models). The Project provides further detailed datasets for CSD's and USGS's AEM evaluation efforts and pending internal mission plans. (WSF Nebraska GeoCloud Award# 4164, CSD County Groundwater Atlas map creation, updated water level dataset creation/mapping, CSD testhole database).

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.

Groundwater is a critical component of stream function and watershed health. The data resulting from this Project will benefit several watersheds and one major NDNR managed basin (Missouri Tributaries) and will be vital for making informed decisions regarding management within the watersheds/basins. AEM data will identify areas of groundwater recharge and can serve as the basis for various NRD projects which enhance such recharge (e.g. recharge basins). In addition, this data will help further identify and refine areas of hydrologic connection between groundwater and surface water (stream/aquifer interactions). A more detailed knowledge of this connection will help the NRDs and state agencies like NDNR implement programs to manage the effect of groundwater pumping on streamflow as well as enhance recharge from streams into the shallow groundwater system. These actions, while supporting sustainable groundwater and surface water resources, will also benefit the many animal and plant species (some of them threatened or endangered) which depend on these ecosystems.

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 Nebraska State Water Planning and Review Process (NDNR 2015) lists the following objectives: 1) Maintain data, information, and analysis capabilities for water planning, including specific programs for collecting, maintaining, and distributing information on stream flows, as well as analyzing water uses and water supplies across the state; 2) Provide staff and resources to support planning and implementation of water resources projects; 3) Support locally developed water management plans for managing hydrologically connected water supplies; 4) Provide resources to map and identify areas vulnerable to flood damage; and 5) Provide coordination of federal agencies, state agencies, local natural resources districts (NRDs), and other water interests for the development of water resources programs and projects. The collection of AEM data and the incorporation of that data into an overall aquifer framework directly supplements Objective 1 through improved data, information, and analysis capabilities. The data collected provides greater understanding of the extents, thickness, and interconnection of aquifer systems. That greater understanding directly informs analysis of streamflow in the hydrologically connected water resources of the State. Water uses and supplies are analyzed as part of the FAB Report, done annually by the NDNR, through modeling of those hydrologically connected areas. The AEM data and the resulting interpretation and framework will be submitted to the NDNR as the best available data for use in the FAB Report. The Project directly supplements the staff and resources of the State for planning and management of the water resources of the state. The Project partners will utilize the data collected and the interpretation of that data to further their expertise in the local hydrogeologic framework. That expertise is utilized by the management and the NNRD Board of Directors to develop the appropriate plans, programs, and projects for the protection and conservation of the water resources. The NNRD partners with many agencies of the state including NDNR, NDEE, DHHS, the Nebraska Game and Parks Commission (NGPC), and others with an interest in the protection and conservation of the state's water resources. The Project partners represent local, regional, and state level interests, cooperatively studying the water resources of the state. Additionally, the data collected is shared with other non-partner agencies and the general public to provide an overall greater understanding of the hydrogeologic framework. That understanding is fundamental to any program or project undertaken to protect and conserve the water resources.

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

- Describe the federal mandate.
- Provide documentary evidence of the federal mandate.

- Describe how the project meets the requirements of the federal mandate.
- Describe the relationship between the federal mandate and how the project furthers the goals of water sustainability.

As described, a primary function of this Project will be to gain greater understanding of the aquifer occurrence and geometry within several WHPAs and complete and enhance aquifer framework coverages for the NNRD. Under the federal Safe Drinking Water Act, public water suppliers are required to provide drinking water that meets various federal standards or Maximum Contaminant Levels (MCLs), with the most applicable being the 10 parts per million MCL for nitrate-nitrogen. Understanding the limitations of the aquifers in this area, as well as possibly identifying aquifer volume and recharge areas within those WHPAs, will help those systems evaluate and manage possible threats to their groundwater supplies. In addition, it will provide NNRD with additional information to promote agricultural and fertilizer best management practices (BMPs) in those areas so as to minimize the occurrence and likelihood of nitrate contamination of groundwater supplies.



AQUA GEO FRAMEWORKS

130360 CR D
Mitchell, NE 69357

7/14/2019
Mr. Bob Hilske
General Manager
62161 Hwy 136
Tecumseh, NE 68450

Dear Bob,

As requested, the estimated costs associated for **Nemaha Natural Resources District Airborne Electromagnetic Hydrogeologic (AEM) Mapping** project is as follows. Approximately 788 kilometers of AEM data will be collected as part of the project. AGF will build the database, perform the geophysical analysis and inversion, and complete the interpreted hydrogeologic framework and report.

Costs

| | |
|------------------------------------|-----------|
| AEM survey | \$157,400 |
| Database Development and planning | \$78,700 |
| Geophysical Analysis | \$45,253 |
| Hydrogeologic framework and report | \$112,147 |
| Total | \$393,500 |

If you have any questions, please do not hesitate to call.

Sincerely,

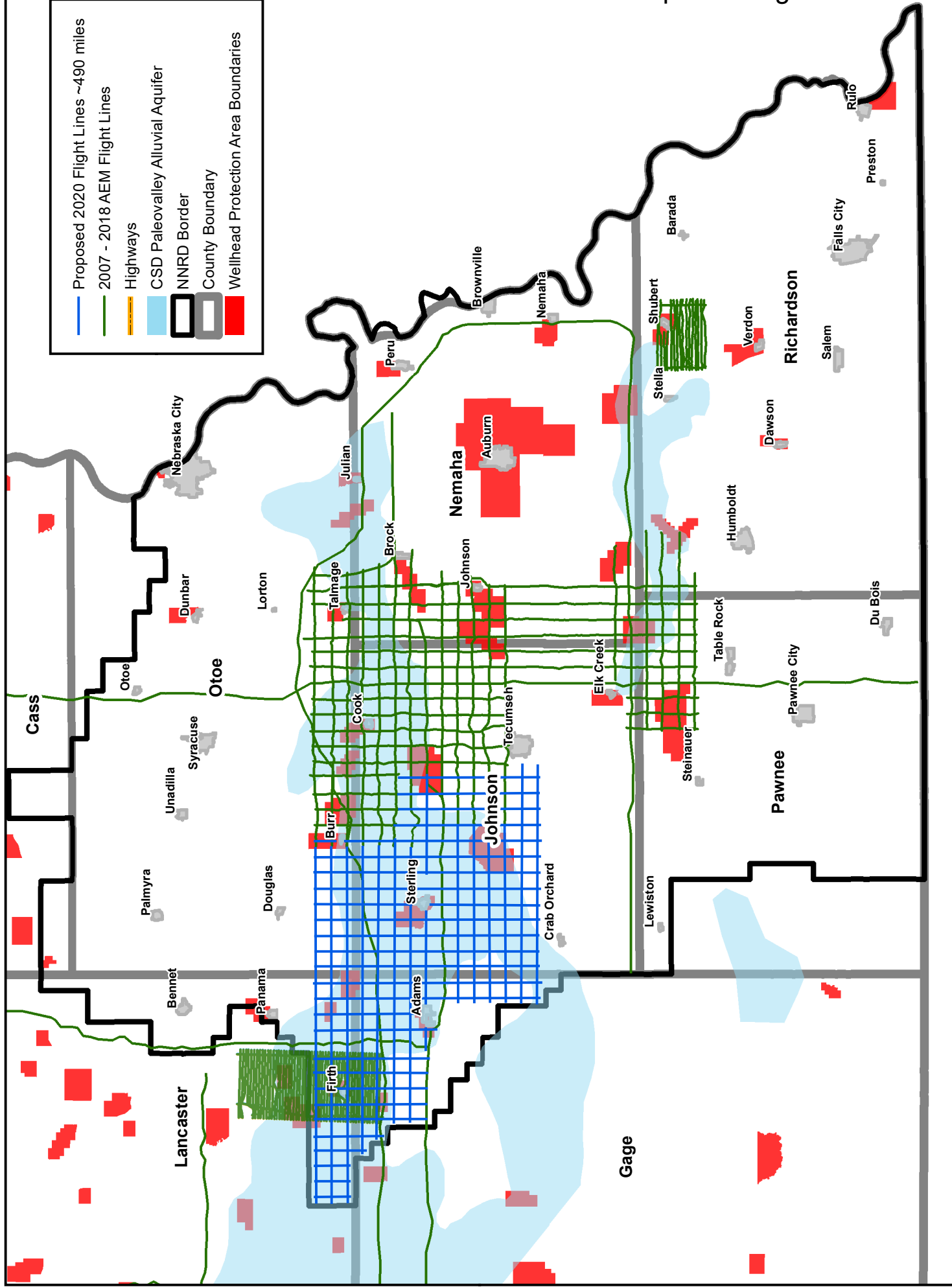
A handwritten signature in black ink, appearing to read 'James C. Cannia', written over a light blue horizontal line.

James C. Cannia P.G.

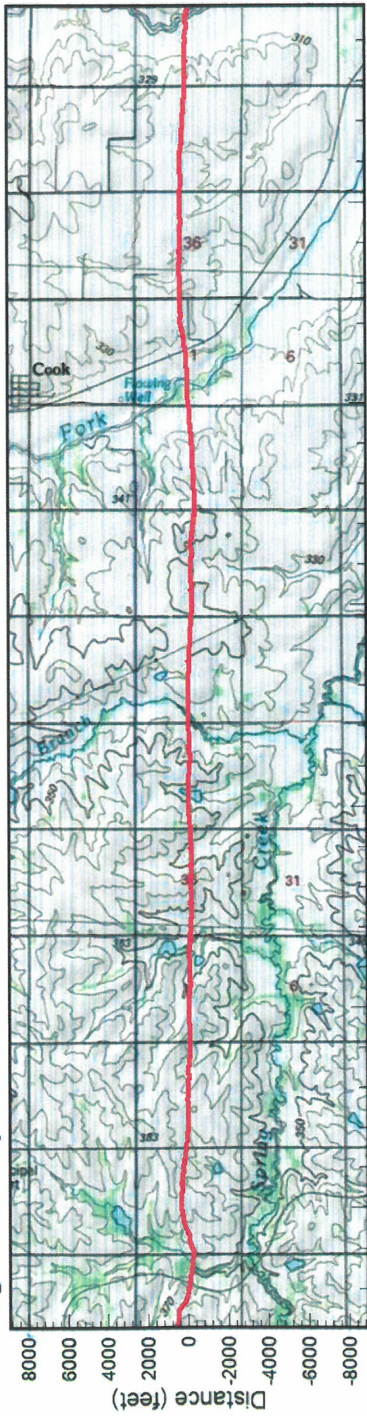
Attachment 2 - Proposed Flight Lines



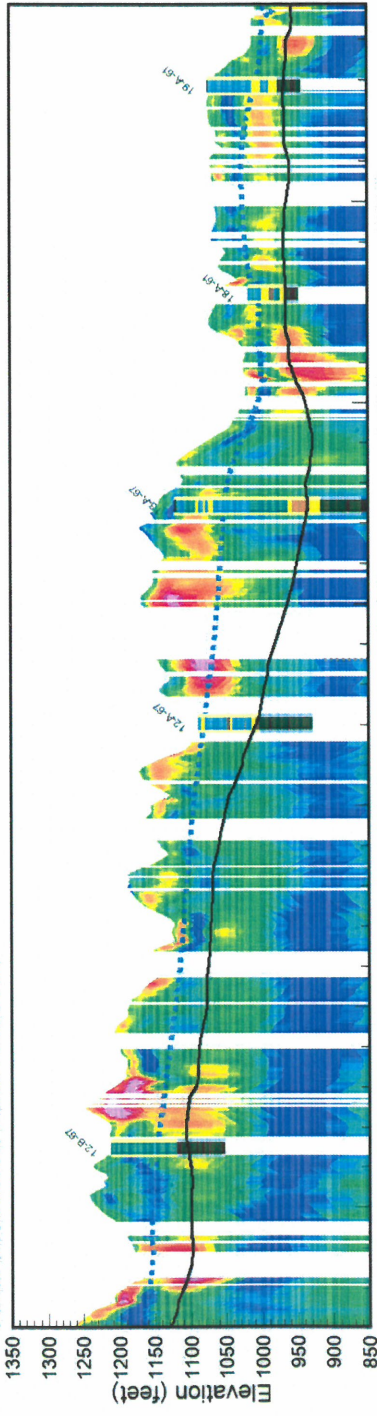
- Proposed 2020 Flight Lines ~490 miles
- 2007 - 2018 AEM Flight Lines
- Highways
- CSD Paleovalley Alluvial Aquifer
- NNRD Border
- County Boundary
- Wellhead Protection Area Boundaries



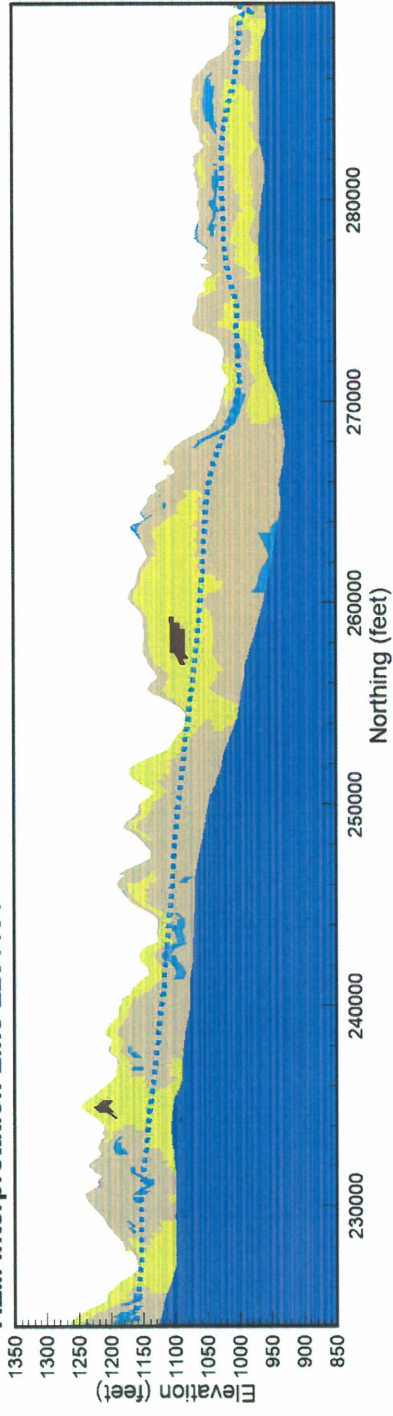
Flight Path Map Line L201101



AEM Inversion Line L201101

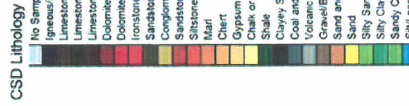
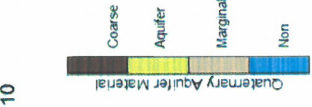


AEM Interpretation Line L201101



Results of the final inversion of Airborne Electromagnetic (AEM) data collected along flight lines within the Nemaha Natural Resources District (NNRD) June 13-17, 2018. The red line on the Flight Path Map (US Geological Survey 100K Topo) indicates the location of the data collection. The AEM inversions shown are Spatially-Constrained using the Aarhus Geo Software Workbench version 5.8.3 in the indicated electrical resistivity color scale. Boreholes displayed on the AEM inversion profile are within 1/4 mile of the flight line are from the Conservation Survey Division (CSD) public website downloaded on September 9, 2018. Lithology and stratigraphy are indicated by the legends. Gray dashed lines when visible on the AEM inversions profile indicate the estimated depth of investigation (DOI). White gaps in the AEM inversion profile indicate gaps in data coverage due to electromagnetic coupling or areas that were not flown due to infrastructure. The solid black line on the AEM inversion profile indicates the interpreted stratigraphic contact of the IP= undifferentiated Pennsylvanian formations/groups. The 1995 CSD water table is represented by a dashed blue line. The AEM interpretation profiles shows Q=Quaternary materials classified into the four groups indicated by the legend. The undifferentiated Pennsylvanian is indicated as a blue fill below the Quaternary. The depth extent of the profile is optimized to illustrate the Quaternary materials. Prepared for the NNRD and the Eastern Nebraska Water Resources Association (ENWRA) by Aqua Geo Frameworks, LLC.

Resistivity (ohm-m)



Project and Objectives Matrix Table

| Objective/Project | Management Concern | Sponsor | Area (mi ² / line km) | Potential Funding Sources | Fiscal Years | Estimated Cost* | Notes |
|---|---------------------------------|------------|----------------------------------|--|--------------|-----------------|---|
| 3. Estimate Recharge Areas and Rates | | | | | | | |
| A. Map recharge areas | recharge/sustainability/quality | all 6 NRDs | -- | ENWRA Dues/NRDs/NET/WSF/USGS | 2021-2031 | -- | evaluate AEM and existing data (potential UNL vadose, NGC, USGS, CSD, DNR collaborations) to identify recharge areas and target study areas |
| B. Maintain and add/re-evaluate vadose zone stations & recharge projects | recharge/sustainability | all 6 NRDs | -- | ENWRA Dues/USGS/NET/WSF | 2021-2031 | \$400,000 | assume 10 stations at \$40,000 per station, requires Technical Advisor to direct and evaluate |
| 4. Assess Potential Connections Between Groundwater & Surface Water | | | | | | | |
| A. Continue to evaluate HCAs and unidentified HCAs | interrelated water | all 6 NRDs | -- | USFWS/ENWRA Dues/WSF/CSD/NET/county/NRDs | 2021-2031 | -- | update CSD datasets; work with DNR to get Lower Platte Missouri River Tribes model (LPMT) updated with AEM and NGC frameworks |
| B. Map saline groundwater | interrelated water, quality | LPS/LPN | -- | NRDs/ENWRA Dues/NET/WSF/USFWS | 2021-2031 | -- | map salt spring & stream reaches and salt/fresh (Maha) boundary in Dakota formation using variety of methods |
| C. Review/incorporate ongoing work in alluvial aquifers | interrelated water | all 6 NRDs | -- | ENWRA Dues/NET/WSF/NRDs | 2021-2031 | -- | identify gaining/losing reaches, streambed characteristics, potential cross aquifer connections |
| 5. Estimate/Calculate Water Budgets | | | | | | | |
| | management decisions | all 6 NRDs | -- | ENWRA Dues/NET/WSF/DNR/NRDs | 2021-2031 | \$100,000 | part of ultimate goal of a 3-D hydrogeological framework and water budget for all ENWRA, work with DNR on LPMT model updates |
| 6. Characterize Natural And Anthropogenic Water Quality Concerns | | | | | | | |
| | quality/recharge/sustainability | all 6 NRDs | -- | DEQ/EPA/USGS/ENWRA Dues/WSF/NET | 2021-2031 | \$300,000 | analyzed constituents vary according to concern in primary or secondary aquifers, continue pilot sites and consider collaborative projects |
| 7. Assemble, Analyze, and Distribute Data | | | | | | | |
| A. Continued Sponsorship and Participation in NGC (See Objective 2E above) | -- | all 6 NRDs | -- | ENWRA Dues/CSD/USGS/WSF/DNR/DEQ/NRDs | 2021-2031 | -- | Interlocal Agreement will outline this annual budget item, NGC will house and make accessible the bulk of our data |
| B. ENWRA progress and assessment updates to partners, the online website, and presentation audiences | -- | all 6 NRDs | -- | -- | 2021-2031 | -- | joint effort with Technical Advisors, Data Providers, and Project Coordinator |
| 8. Develop a Variety of Partners and Funding Sources | | | | | | | |
| | -- | all 6 NRDs | -- | -- | 2021-2031 | -- | on-going effort as opportunities arise |
| 9. Continue to Assess the Applicability of New Technology and Parallel Projects/Developments/ Precedents | | | | | | | |
| | -- | all 6 NRDs | -- | -- | 2021-2031 | -- | this task will occur if potential new technology and potential parallel projects/entities/laws develop |

Project and Objectives Matrix Table

| Objective/Project | Management Concern | Sponsor | Area (mi ² / line km) | Potential Funding Sources | Fiscal Years | Estimated Cost* | Notes |
|---|-----------------------------|------------|----------------------------------|--------------------------------------|--------------|-----------------|--|
| 1. Retain a Project Coordinator | -- | all 6 NRDs | -- | ENWRA\Grants | 2021-2031 | \$700,000 | \$70,000 annually for salary and benefits over 10 years (shared position, 40% CSD, 60% ENWRA renews April 2020) |
| 2. Identify the Location & Vol. of Aquifers | | | | | | | |
| A. Map priority areas using AEM | | | | | | | |
| Isolated/limited quantity aquifers | limited quantity | all 6 NRDs | 2,500 / 2,000 | ENWRA Dues/NET/WSF/DNR/NRD | 2021-2031 | \$1,000,000 | block flights, aquifer boundaries, target depths will vary |
| Area north of Adams and other limited areas | limited quantity | Nemaha | 135 / 1,350 | ENWRA Dues/NET/WSF/DNR/NRD | 2021-2031 | \$540,000 | delineate boundaries, use AEM or combination of methods, target top 300 feet |
| Missouri River Upland tributaries | limited quantity | PMR | 1,200 / 800 | ENWRA Dues/NET/WSF/DNR/NRD | 2021-2031 | \$400,000 | map Quaternary tributary aquifers present between the uplands and Missouri River, use AEM or combination of methods, target top 800 feet |
| Fremont to Arlington area | limited quantity & quality | PMR - LPN | 135 / 1,350 | ENWRA Dues/NET/WSF/DNR/NRD | 2021-2031 | \$540,000 | map area between Fremont and the Arlington paleovalley with AEM, target top 300 feet |
| B. Secondary bedrock aquifer reconnaissance | limited quantity & quality | all 6 NRDs | -- | ENWRA Dues/USGS/NET/WSF/DEQ/DNR | 2021-2031 | >\$1,000,000 | next phase to be determined - builds on initial reconnaissance of quality/sustainability - 2015 WSF Application with USGS, deep test hole and monitoring well investments, and AEM investments |
| C. Advance geologic test holes | limited quantity & quality | all 6 NRDs | -- | ENWRA Dues/NET/WSF/CSD/NRDs | 2021-2031 | \$540,000 | assume 60 holes averaging 600 feet deep at \$9,000 per hole for lithology match-up with AEM |
| D. Maintain and add monitoring wells | quantity and quality trends | all 6 NRDs | -- | ENWRA Dues/USGS/NET/WSF/DEQ/DNR | 2021-2031 | \$500,000 | assume 50 wells at \$10,000 per well (includes select installations of telemetry or other mon. instrumentation) |
| E. Continued sponsorship and participation in Nebraska GeoCloud (NGC) to house and access AEM data and produce accessible products online | geologic framework | all 6 NRDs | -- | ENWRA Dues/CSD/USGS/WSF/DNR/DEQ/NRDs | 2021-2031 | \$700,000 | support the Interlocal Agreement and coordinator/specialist position. Continue to evaluate CSD staffing needs/availability/workload, NGC related positions and/or NGC consultant contracts (est. costs parallel objective 1) |

July 25, 2019

Mr. Jeff Fassett and members of the Nebraska Natural Resources Commission
Nebraska Department of Natural Resources
301 Centennial Mall South
Lincoln, Nebraska 68509-4676

Re: Nemaha Natural Resources District (NNRD) Airborne Electromagnetic Hydrogeologic Mapping
Water Sustainability Fund (WSF) Application

Dear Director and Reviewers:

This letter is to confirm the Eastern Nebraska Water Resources Assessment (ENWRA) coalition's support of the NNRD's Airborne Electromagnetic Hydrogeologic Mapping WSF Application. The NNRD is one of the 6 eastern Nebraska NRDs who sponsor ENWRA and employ Airborne Electromagnetic (AEM) Survey as a primary assessment tool to efficiently map and understand the complex aquifer systems in the eastern Nebraska region.

ENWRA's ultimate goal is to develop a three-dimensional geologic framework and water budget for the eastern Nebraska region. The 490 line miles of AEM survey data obtained with this grant work northwest of Tecumseh, Nebraska will fill in a crucial, complex area by extending the NNRD's 2018 AEM grid coverage (WSF #5189) westward to connect up with ENWRA's 2007 and 2009 AEM Firth-Sprague area AEM survey flight blocks. The Project will also fill in the paleochannel aquifer framework between ENWRA's 2015 AEM reconnaissance lines and two NRDs. The project area is listed as a priority mapping area in ENWRA's Long Range Plan (LRP) and the project results are planned for incorporation into the Nebraska GeoCloud (WSF award #4164) under ENWRA's current data management objectives.

This application builds on significant investments made by ENWRA NRDs in hydrogeological assessment. We are hopeful of the application's approval and support the importance of understanding the aquifer framework for water sustainability.

Thank you for your work in supporting this effort.

Sincerely,



Kathleen Cameron, Survey Hydrogeologist/ENWRA Coordinator
kcameron_enwra@lpsnrd.org
(402) 419.4798

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