

# NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

## Section A.

### ADMINISTRATIVE

PROJECT NAME: *Advanced Hydrogeologic Frameworks for Aquifer Management in Critical Sections of the Platte River Basin*

#### PRIMARY CONTACT INFORMATION

Entity Name: *Central Platte Natural Resources Districts*

Contact Name: *Duane Woodward*

Address: *215 Kaufman Ave Grand Island, NE 68803*

Phone: *308-385-6282 or 308-390-7850*

Email: *Woodward@cpnrd.org*

Partners / Co-sponsors, if any: *Co-sponsor is Twin Platte NRD*

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

Grant amount requested. \$ *579,600.00*

Loan amount requested. \$ [Click here to enter text.](#)

If Loan, how many years repayment period? [Click here to enter text.](#)

If Loan, supply a complete year-by-year repayment schedule.  
[Click here to enter text.](#)

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

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

N/A  Obtained: YES  NO

Surface Water Right	N/A <input type="checkbox"/> Obtained: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
USACE (e.g., 404 Permit)	N/A <input type="checkbox"/> Obtained: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Cultural Resources Evaluation	N/A <input type="checkbox"/> Obtained: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Other (provide explanation below) Click here to enter text.	N/A <input type="checkbox"/> Obtained: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>

3. Are you applying for funding for a combined sewer over-flow project?

YES  NO

If yes, do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality?

YES  NO

If yes attach a copy to your application. [Click here to enter text.](#)

If yes what is the population served by your project? [Click here to enter text.](#)

If yes provide a demonstration of need. [Click here to enter text.](#)

If yes and you were approved for funding in the most recent funding cycle, then resubmit the above information updated annually but you need not complete the remainder of the application.

4. If you are or are representing an NRD, do you have an Integrated Management Plan in place, or have you initiated one?

N/A  YES  NO

5. Has this application previously been submitted for funding assistance from the Water Sustainability Fund and not been funded?

YES  NO

If yes, have any changes been made to the application in comparison to the previously submitted application? [Click here to enter text.](#)

If yes, describe the changes that have been made since the last application. [Click here to enter text.](#)

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

6. Complete the following if your project has or will commence prior to next July 1<sup>st</sup>.

As of the date of submittal of this application, what is the Total Net Local Share of Expenses incurred for which you are asking cost share assistance from this fund? \$ NA

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. NA

Estimate the Total Net Local Share of Expenses and a description of each you will incur between the date of submittal of this application and next July 1<sup>st</sup> for which you are asking cost share assistance from this fund.  
\$ NA

Section B.

DNR DIRECTOR'S FINDINGS

Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?

YES  NO

1(a). If yes (structural), submit a feasibility report (to comply with Title 261, CH 2) including engineering and technical data and the following information:

A discussion of the plan of development (004.01 A);  
NA

A description of all field investigations made to substantiate the feasibility report (004.01 B); NA

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); NA

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

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

Required geologic investigation (004.01 E 1); NA

Required hydrologic data (004.01 E 2); NA

Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). NA

1(b). If no (non-structural), submit data necessary to establish technical feasibility including, but not limited to the following (004.02):

A discussion of the plan of development (004.02 A);

*BACKGROUND The sponsors recognize that analysis of groundwater and surface water resources for optimum use requires the best available groundwater models, models that are most influenced by the hydrogeological framework, which in turn represents an aquifer's capacity to store and transmit of water. All of the Sponsors are heavily invested in groundwater and surface water management and related infrastructure projects in the Platte and Republican River basins. Stewardship for these resources has been a driving force behind many of the*

successful management and related water research activities ongoing throughout the project area. The NRDs rely on application of the cutting-edge technologies and information to understand the natural system, and selection of the appropriate management activities is vital to securing a viable water supply for these areas. Implementation of these activities can be expensive and time consuming to design and execute and they are also often challenged by other interests regarding their effectiveness and suitability to provide equitable water use within the basins. Therefore, it is recommended that airborne electromagnetic (AEM) surveys be performed to supplement existing testhole information and be used to develop new, highly detailed hydrogeologic frameworks. Detailed hydrogeologic frameworks will give greater confidence to regulators, investors and the public in water management decisions and practices because the understanding of the natural system is represented in detail not previously achieved. The AEM surveys will also be used for siting the optimal location for infrastructure development activities like managed aquifer recharge areas. The sponsors have invested and will continue to invest taxpayer funds to operate and expand these activities in the future and this information guides the best use of these funds for best return. Historic and traditional geologic information must be part of any AEM study, and it will be included in the hydrogeologic framework generated in this study. The AEM survey proposed here is a robust scientific practice with a very successful history of use in Nebraska (Abraham, 2012, Abraham, 2013). AEM provides nearly continuous high density, high quality data of the subsurface. It is acquired quickly without trespass onto private property and without any property damage. Once acquired, it can be analyzed quickly and related to the lithologic materials present in the aquifer. A three-dimensional evaluation of the aquifer can be made to estimate various percentages of the aquifer materials, the amount of material saturation and location/relationship of such materials to existing extraction wells. It is also used to effectively site managed aquifer recharge locations (Lawrie, 2012). All of this information will be made available to the sub-regional groundwater models developed or in development for this area greatly improving their performance.

#### PROJECT DESIGN

A combination of geophysical, geologic, remote sensing and geographic information system (GIS) technologies will be applied to construct a hydrogeologic framework of the Platte River basin area within the Twin Platte and Central Platte Natural Resources Districts. Also included is an area of dense flight lines covering the NCORPE area, jointly own and managed for water augmentation by Twin Platte NRD and the 3 Republican NRD's. Development of a GIS project will bring known information into a single group of databases to allow for analysis related to where there is historic geologic, hydrologic, land surface elevation data, testhole and well information for the area. This information will be included as a feature for Google Earth being developed by AGF for displaying project information quickly and easily to the public via the World Wide Web. All metadata for the project will be part of the data report. Final flight planning for the AEM survey will be completed before commencement of the flights. Survey flights will be conducted during summer or fall of 2016. Aqua Geo Frameworks (AGF) will provide all planning, contracting, quality assurance/quality control for completing the flights. The NRDs will participate in the planning to give guidance on location of where information is to be collected. The NRDs will also assist in other

aspects of the project, including but not limited to: public information campaign, daily communications with the AGF project chief for updates, and information review. Upon completion of the AEM survey, AGF will immediately begin geophysical processing, including numerical inversions to create a preliminary dataset to be shared with the NRDs. This will allow the NRDs to quickly work with the preliminary data for their planning purposes. Proprietary enhancements will be developed as part of the in-kind match from AGF for the project which will increase the speed and accuracy of the processing software for this project. Post-geophysical processing, the AGF staff will begin development of the hydrogeologic framework. At times during its development, interaction with NRDs staff will be needed to keep both parties apprised of progress and provide input from one another. After completion of the framework, a data publication will be produced and reported to the NRDs. Test hole information collected in the TPNRD during 2014 by the Conservation and Survey Division, UNL and funded by NEDEQ will be used in this work and also used as in-kind match for the project. Design criteria are based on an estimate of survey areas delineated to cover the Platte Valley and the NCORPE project area within the NRDs. Approximately 1,360 miles of linear AEM data will be collected in 3 separate areas. The initial flight planning and design are complete and shown as attachments in Figure 1 and 2. It is important to note that the best results for any survey are achieved with the main flight lines running perpendicular to the strike of the aquifers being mapped. Our experience in western Nebraska and elsewhere has shown a high probability of success in mapping the aquifer (s) of the NRDs in great detail. The AEM tools that will be used have the ability to image the aquifers to a depth of ~950-1,300 feet in the area based on previous work done for western Nebraska (Abraham 2012). The project plan is to fly continuous AEM lines ~3 mile grids in the TPNRD and CPNRD Platte River areas. The grids will be evenly spaced and oriented east-west and north-south directions. Within the TPNRD a small number of diagonal reconnaissance lines will be flown in the northeast corner of the flight grid. In the NCORPE area, the plan includes a dense block of AEM flight lines centered on the core area of water well production for water enhancement project distribution to the Platte and Republican Rivers. This dense block will consist of flight lines oriented east-west spaced approximately 220 yards apart with perpendicular flight lines approximately 1 mile apart oriented north-south. Additional grid lines surrounding this area will be flown at 1 mile intervals. Flight operations should take 1 to 3 days for each location based on flying conditions and weather. All AEM flights are performed under visual flight rules and wind speeds below 15 knots per hour. Flights are often performed in the mornings. No flights occur over homes, buildings, livestock or major highways, and notification will be provided to public safety organizations

#### Objectives

1. To increase understanding of the aquifer(s) within the Platte River basins in the Twin Platte and Central Platte Natural Resources Districts, inclusive of the NCORPE area, by conducting a AEM survey and using the collected and historic data to construct a hydrogeologic framework of the AEM surveyed areas.
2. Use the collected information for management purposes such as sighting Managed Aquifer recharge areas and other infrastructure in optimal locations. This will provide economic benefits to the Nebraska Taxpayer by efficiently using tax dollars in the best manner possible.

3. Use the collected data to simulate the impacts of water management activities in future efforts by providing a more realistic representation of the natural system, thus improving the results of groundwater and surface water models.
4. To increase understanding of the aquifer characteristics of the area relating to the volume and geologic/geographic distribution of aquifer material.
5. To provide information on the potential locations for future testholes and observation/monitoring wells.
6. Provide a data report on the survey results.

#### *Outcomes*

1. The 3-D maps and other products will improve groundwater management evaluations by all Natural Resources Districts in the project area. The Districts, working in cooperation with the Department of Natural Resources, municipalities, irrigation Districts, and other water users, are in the process of implementing integrated management plans. These plans are adaptive in nature and will be potentially updated with results of data analysis based on information collected from this effort. Data from this project will improve these agencies' ability to analyze and characterize the relationship between surface water and groundwater.
  2. Data also will be used for further development of groundwater models for use in integrated management plans.
  3. The maps and other products will be the basis for decisions that will result in more effective use of the water supply from the NCORPE area. The NCORPE wells will be used to supplement flows in the Platte and Republican Rivers at critical times. Understanding the groundwater system in a very detailed manner will provide understanding of the natural system not achievable by any other means. This understanding greatly enhances the groundwater models under construction, thus allowing them to produce more accurate predictions of future management scenarios.
  4. The 3-D framework and other products will improve the ability of municipalities, natural resources Districts, and water users to locate new supplies of water as needed. These products will be available through the World Wide Web via Google Earth maps and related data developed by XRI for this project.
  5. This project will enhance the ability to identify areas desirable for groundwater recharge. Recharge is being considered as a management tool to protect water resources in the NRDs, as they apply integrated management plans.
  6. The methods refined in this project may be applied to other areas of Nebraska. The results, data, and lessons learned from the aerial geophysical survey will be shared with other NRDs and other entities at professional conferences. Other areas of the state can benefit from the experience gained in this effort as they put similar programs of study together.
  7. Publicity via news releases to local media. Television and radio coverage of the aerial flights will be coordinated from the NRDs. Articles about the project will be published in the NRDs newsletter.
  8. Data collected from aerial methods will be verified with data from borehole logging, drilling of additional test holes, and surface geophysical surveys.
- #### *Economic, social and/or public health impacts*
1. Ensuring efficient use of limited funding for the management of hydrologically-connected waters. This data will significantly improve the groundwater models that are

being developed to understand /evaluate management plans and activities. Projects like NCORPE, and the modified canal systems within CPNRD are very large investments of public funding and are vital to the requirements of interstate decrees and management in both river basins.

2. Protecting the long-term potential for economic development of the project area. The availability of a secure water supply is an important factor in economic development, and this project will facilitate protection of the water supply.

4. Improving the ability of the Districts and the Department of Natural Resources to manage connected groundwater and surface water. Management areas for groundwater and surface water are only as effective as the information they are built upon. The groundwater models being developed for this area will be enhanced by this improved data set. The current regional model will be adapted to local use by adding additional information at a localized scale. These new models will then be used to answer more explicit questions about the future of groundwater and surface water of the area. This effort is one of the base inputs to the new modeling effort.

5. Improving the ability to protect ground water supplies from contamination, by identification of fields that are most likely to leach agricultural chemicals. These maps will identify areas of greater rates of recharge and will allow all parties involved to better understand the application and fate of agricultural chemicals and other constituents. These maps will improve our knowledge of the subsurface and the flow paths of the area. This greater understanding of the source, extent and fate of nonpoint source contamination will lead to more effective strategies of managing the problem.

Publications and references:

Abraham, J.D., Cannia, J.C., Bedrosian, P.A., Johnson, M.R., Ball, L.B., and Sibray, S.S., 2012, Airborne electromagnetic mapping of the base of aquifer in areas of western Nebraska, May 2012: U.S. Geological Survey Scientific Investigations Report 2011–5219, 30 p. (Also available at <http://pubs.usgs.gov/sir20115219>.)

Abraham, J.D., Bedrosian, P.A., Asch, T.H., Ball, L.B., Cannia, J.C., Phillips, J.D., and Lackey, S., 2012, Evaluation of geophysical techniques for the detection of paleochannels in the Oakland area of eastern Nebraska Water Resource Assessment, May 2012: U.S. Geological Survey Scientific Investigations Report 2011–5219, 40 p. (Also available at <http://pubs.usgs.gov/sir20115228>.)

Abraham, J.D., Carney, C.P., Cannia, J.C., 2013, Data Report on Mapping the Hydrogeology of the Clarkson Area within the Lower Elkhorn Natural Resources District Using Airborne Electromagnetic Survey, Exploration Resources International.

Lawrie, K.C., Brodie, R.S., Tan, K.P., Gibson, D., Magee, J., Clarke, J.D.A., Halas, L., Gow, L., Somerville, P., Apps, H.E., Christensen, N.B., Brodie, R.C., Abraham, J., Smith, M., Page, D., Dillon, P., Vanderzalm, J., Miotlinski, K., Hostetler, S., Davis, A., Ley-Cooper, A.Y., Schoning, G., Barry, K. & Levett, K., 2012. Broken

A description of field or research investigations utilized to substantiate the project conception (004.02 B); See published reports shown above by Abraham and Cannia 2012 & 2013

A description of the necessary water and/or land rights, if applicable (004.02 C); NA



A discussion of the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D). *We do not anticipate any effects on structural measures.*

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative. *The next best alternative is to drill test holes. If 1 testhole is drilled for each mile it would require 1,360 test holes to be drilled. Most test holes in the project would require drilling to 500 feet so at \$15 / foot each test hole would cost \$7500. The total cost for 1360 test holes would be \$10.2 million. There would also be additional cost to interpret these data and build the geology framework for the area.*
3. Document all sources and report all costs and benefit data using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies shall be fifty (50) years or with prior approval of the Director, up to one hundred (100) years [T261 CH 2 (005)].
  - Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01). *A breakdown of the project cost by work task is shown in the budget attachment. The total project cost is \$966,000 and the request for WS Funding is \$579,600. The remaining \$386,400 will be provided by the sponsors.*
  - Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe any intangible or secondary benefits separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, such that the economic feasibility of the project can be approved by the Director and the Commission (005.02). *There is no tangible direct benefit as a result of this project; however, an improved understanding of the groundwater aquifer with-in the CPNRD and Twin Platte NRD will lead to improved decision-making tools.*
  - All benefit and cost data shall be presented in a table form to indicate the annual cash flow for the life of the proposal, not to exceed 100

years (005.03). *No direct tangible benefit versus cost has been provided for this project*

- In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, the economic feasibility of such proposal shall be demonstrated by such method as the Director and the Commission deem appropriate (005.04). *Okay*

4. Provide evidence that sufficient funds are available to complete the proposal. *The CPNRD 2015/ 2016 FY property tax collected was \$6,115,709.65 and the current tax level is 0.003842 on a valuation of \$15,919,152,725.00. The CPNRD has \$117,400 budgeted for the project this year and will budget the remaining \$56,480 the next budget year for this project. The CPNRD letter of support has been included with this application in a attachment.*

*The TPNRD 2015/ 2016 FY property tax collected was \$2,632,300.00 and the current tax level is 0.006305 on a valuation of \$5,684,667,823.00. The TPNRD has \$163,600 budgeted for the project this year and will budget the remaining \$48,920 the next budget year for this project. The TPNRD letter of support has been included with this application in a attachment.*

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

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

7. Describe how the plan of development minimizes impacts on the natural environment.

*There is no development with this project. The project will basically collect Aquifer information in Lincoln and Dawson counties*

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

*The CPNRD and the TPNRD has the authority under Nebraska State Statute Chapter 2 Article 32 to carry out this project under its authorized purposes relating to the development, management, utilization, and conservation of groundwater and surface water. This includes the NRD's authorities to enter into contracts or agreements, budget and expend levied property taxes, and own and operate property or equipment*

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

*This project provides Aquifer data that will support the Integrated Management Planning for DNR, CPNRD, and TPNRD. Determining and accounting for hydrological connect ground water is a important component of Integrated Management. Collection of aquifer information about materials (clay, silt, sand, and gravel) and location is needed to analysis hydrologic connection. This project will provide this type of data in numerous locations along the Platte River from Lake McConaughy to Overton, NE.*

10. Are land rights necessary to complete your project?

YES  NO

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

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

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

11. Identify how you possess all necessary authority to undertake or participate in the project. *The CPNRD and TPNRD has the authority under Nebraska State Statute Chapter 2 Article 32 to carry out this project under its authorized purposes relating to the development, management, utilization, and conservation of groundwater and surface water. This includes the NRD's authorities to enter into contracts or agreements, budget and expend levied property taxes, and own and operate property or equipment.*

12. Identify the probable environmental and ecological consequences that may result as the result of the project. *Sound integrated management of groundwater and surface water is critical to maintaining flows of the Platte River needed by endangered and threatened species. Integrated management relies on decision making tools such as the COHYST model and supporting data sets. This project seeks to fill needed aquifer data for understanding hydrological connected groundwater that supports determining baseflows which can enhance and retime flow needed by endangered and threatened species*

## Section C.

### NRC SCORING

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

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

#### **Notes:**

- The responses to one criterion *will not* be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.
- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted in parenthesis. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.
- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

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

1. 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.

NA

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.

*This project will provide supporting Aquifer information for the TPNRD and CPNRD IMP's. The TPNRD and CPNRD IMP's were put in place in September 2009. The aquifer information being collected by this project covers much of the Overappropriated area with-in the TPNRD and CPNRD. One of the main goals of the IMP's with-in the Over appropriated area is to incrementally achieve and sustain a fully appropriated condition and a planned objective to accomplish this is to develop and maintain data and analytical tools such as COHYST and other programs and projects needed to implement the IMP. This provides benefits by developing aquifer information or data for use in analytical ground water tools.*

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

List the following information that is applicable:

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

*This project does provide information about aquifer materials and the storage and recovery capabilities of the aquifer in the Platte over appropriated area .The project will also provide information in the NCORE area of the Platte and Republican Basin. This aquifer information is important data that is needed to make a recharge project work and determine the amounts of increased stream base flow provided by a recharge project.*

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;
  - List the goals the project provides benefits.
  - Describe how the project will provide these benefits
  - Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

*The project will provide benefits for determining groundwater storage availability so water supply goals for agricultural use, M&I use and water resource conservation can be determined. The project provides these benefits by measuring and defining the aquifer hydro geologic framework for the area shown in the figure 1 and 2 maps attached. One of the long term expected benefits of this project for CPNRD is our Conjunctive Water Management projects with the Thirty Mile, Cozad, and Orchard Alfalfa Canals. These canal systems are being operated to provide excess flow surface water diversion and groundwater recharge with retimed base flow returns to the Platte River. Within the 33,000 acres the districts cover there are 14 CSD testhole that provide the basic hydro geologic information of the area. We believe this project will provide considerable new information that can help estimate the retiming benefits of this project. The TPNRD is looking at similar projects on the North Platte River above North Platte, NE and should realize similar long range benefits.*

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.

This project will provide the state's residents and water resources people with a much better understanding the High Plains groundwater aquifer storage and location within the State's over appropriated area in TPNRD and CPNRD. This project would not directly increase or decrease beneficial use but help define the scope of the groundwater system to meet present and future beneficial uses.

6. Is cost-effective;

- List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.
- Compare these costs to other methods of achieving the same benefits.
- List the costs of the project.
- Describe how it is a cost effective project or alternative.

*The total project cost is \$966,000 and the request for WS Funding is \$579,600. The remaining \$386,400 will be provided by the sponsors This project cost is focused on using Airborne Electromagnetic data collection to provide enhanced Geospatial coverage of the area aquifer. Another alternative is to drill test holes. To provide good coverage of the area 1 testhole could be drilled for each mile. This would require 1,360 test holes to be drilled. Most test holes in the project would require drilling to 500 feet so at \$15 / foot each test hole would cost \$7500. The total cost for 1360 test holes would be \$10.2 million. There would also be additional cost to interpret these data and build the geology framework for the area.*

7. Helps the state meet its obligations under interstate compacts, decrees, or other state contracts or agreements or federal law;
  - Identify the interstate compact, decree, state contract or agreement or federal law.
  - Describe how the project will help the state meet its obligations under compacts, decrees, state contracts or agreements or federal law.
  - Describe current deficiencies and document how the project will reduce deficiencies.

*The State of Nebraska is in an agreement with the State's of Wyoming and Colorado plus the Federal Government (USFWS and USBR) to work on meeting the goals and objectives of the Platte River Implementation and Recovery Plan for endangered and threatened species. One major PRIRP program objective includes restoring and retiming flows in the Platte River to meet habitat needs. This project will help in the analysis of aquifer recharge and pumping to retime base flows to the Platte River by providing new information on aquifer storage volume and location in relation to the Platte River.*

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.

NA

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.

NA

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 local jurisdiction that supports the project includes the TPNRD and CPNRD. The CPNRD 2015/ 2016 FY property tax collected was \$6,115,709.65 and the current tax level is 0.003842 on a valuation of \$15,919,152,725.00. The CPNRD has \$117,400 budgeted for the project this year and will budget an additional \$56,480 the next budget year for this project. The CPNRD letter of support has been included with this application in an attachment.*

*The TPNRD 2015/ 2016 FY property tax collected was \$2,632,300.00 and the current tax level is 0.006305 on a valuation of \$5,684,667,823.00. The TPNRD has \$163,600 budgeted for the project this year and will budget an additional \$48,920 the next budget year for this project. The TPNRD letter of support has been included with this application in an attachment. We have in the past 2 years and know currently have a request in for NET funds.*

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

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

*The local jurisdiction on the project is the Central Platte NRD and the Twin Platte NRD. The results of the project are better estimates aquifer storage along with location, which will improve the TPNRD and CPNRD's groundwater management plan (which includes the IMP's). Therefore, this project directly benefits all the producers, irrigators, ethanol producers, cities, industry, municipal and domestic groundwater users within the TPNRD and CPNRD.*

12. Addresses a statewide problem or issue;

- List the issues or problems addressed by the project and why they should be considered statewide.



- Describe how the project will address each issue and/or problem.
- Describe the total number of people and/or total number of acres that would receive benefits.
- Identify the benefit, to the state, this project would provide.

*The proposed project will provide datasets to improve integrated management of groundwater and surface water to address key statewide water issues. These issues include maintaining water supplies for municipal, domestic, agricultural and industrial uses, ensuring adequate streamflow to comply with the Platte River Program and provide additional aquifer storage information to evaluate managed aquifer recharge (MAR) projects that can enhance groundwater recharge. Understanding ground water storage is beneficial to the state of Nebraska because it provides fundamental knowledge to improve decision making tools such as the COHYST groundwater model. As a result, the benefits realized from this project would not only cover the TPNRD and CPNRD area residents, but also the water supplies of the cities of Lincoln and Omaha who rely on stream flows in the Platte River.*

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 TPNRD and CPNRD are providing the local dollars for the project. See the attachment on project budget that shows the state and NRD’s funding. The support letters for each NRD are also provided as an attachment.*

14. Contributes to watershed health and function;

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

*The US EPA defines a healthy watershed as one in which “natural land cover supports dynamic hydrologic and geomorphic processes within their natural range of variation; habitat of sufficient size and connectivity supports native aquatic and riparian species; and water quality supports healthy biological communities” (US EPA, 2012). This definition encompasses six distinct but interrelated attributes of watersheds and the aquatic ecosystems within them: landscape condition; habitat; hydrology; geomorphology; water quality; and biological condition. Watershed Hydrology is one of the six interrelated attributes and this project is focused on it. The EPA’s notation of a hydrologic regime; is quantity and timing of flow or water level fluctuation. Highly*

*dependent on the natural flow regime and hydrologic connectivity, including surface-ground water interaction. This project is developing an updated aquifer framework in the TPNRD and CPNRD area which can add to the Central Platte River Hydrologic Water Budget analysis and information updates. The information developed with this project can be used to assess current and future watershed health. The watershed included in the TPNRD and CPNRD area is the Platte River and its tributaries from Lewellen, NE and Julesburg, CO to Overton, NE*

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 Department of Natural Resources Annual Report and Plan of Work, dated September 2015 has 5 major objectives. Objective #3 is to Support locally developed water management plans for managing hydrologically connected water supplies. The Four-Year Work Projection for the Upper Platte River Basin outlines plans on using the COHYST groundwater model and pertinent data sets for future integrated management plan analysis. This project likewise will assist in updating Technical information (aquifer framework data) for the TPNRD and CPNRD IMP's.*

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

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

*The proposed project should help Nebraska meet the requirement of a federal mandate to protect endangered species. Specifically in 1997, Colorado, Nebraska, Wyoming, and the U.S. Department of the Interior entered into an Interagency Cooperative Agreement (ICA) partnership which resulted in the Platte River Program aimed at addressing issues regarding federally endangered species (such as the whooping crane, piping plover, least tern, and pallid sturgeon) in the Platte River Basin. Critical to the Program is the provision for maintenance of streamflows in the Platte River and the mitigation of new depletions in the Platte River above Chapman, NE. As a direct result of the ICA, State and local agencies created a Cooperative Hydrology Study [(COHYST), 1998] of the Platte River Basin of Nebraska upstream from Columbus, Nebraska. The purpose of COHYST was to assist Nebraska in complying with the ICA (Luckey and Cannia, 2006) through the integrated management of groundwater and surface water. The objectives of COHYST were to develop databases*

*and tools to assist Nebraska in meeting its obligations for streamflow, to analyze proposed activities to improve streamflows for endangered and threatened species, to assist Natural Resources Districts (NRDs) with regulation and management of groundwater, and to provide a basis for establishing and implementing Nebraska policies and procedures governing groundwater and surface-water resources. This proposed project will improve and provide a better understanding of the aquifer system that provides fundamental knowledge to improve groundwater surface water interaction, and thus helps Nebraska meet its obligation to the Program and the federal mandate of protecting endangered species.*

## Section D.

### PROJECT DESCRIPTION

#### 1. Overview

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

*The sponsors recognize that analysis of groundwater and surface water resources for optimum use requires the best available groundwater models, models that are most influenced by the hydrogeological framework, which in turn represents an aquifer's capacity to store and transmit of water. All of the Sponsors are heavily invested in groundwater and surface water management. Stewardship for these resources has been a driving force behind many of the successful management and related water research activities ongoing throughout the project area. The NRDs rely on application of the cutting-edge technologies and information to understand the natural system. Therefore, it is recommended that airborne electromagnetic (AEM) surveys be performed to supplement existing testhole information and be used to develop new, highly detailed hydrogeologic frameworks. Detailed hydrogeologic frameworks will give greater confidence to regulators, investors and the public in water management decisions and practices because the understanding of the natural system is represented in detail not previously achieved.*

#### 2. Project Tasks and Timeline

Identify what activities will be conducted by the project. For multiyear projects please list what activities are to be completed each year.

*The project can be accomplished in one year. It could split into two funding years if needed. The project has 4 major work tasks to be accomplished during the year. The work task and order they will accomplished in is as follows;*

- 1. Airborne electromagnetic (AEM) survey data collection following flight lines shown on figures 1 and 2 maps. See attachments.*
- 2. Database development using GIS tools to spatially reference AEM data, testhole data, land surface elevations, and well information.*
- 3. Geophysical analysis includes numerical inversions to create a geologic dataset.*
- 4. Hydrogeologic framework development and report which includes a description of the geology in the project area, the breakdown of hydrologic units within the geology, and provides information about the hydraulic properties, boundary conditions, and base of aquifer.*

#### 3. Partnerships

Identify the roles and responsibilities of agencies and groups involved in the proposed project regardless of whether each is an additional funding source. List any other sources of funding that have been approached for project support and that have officially turned you down. Attach the rejection letter.

*The proposed project will be successful because of a strong partnership between local NRD personnel, and private industry experts with Nebraska's water resources backgrounds. NRD personnel include Duane Woodward (Engineering Hydrologist, CPNRD), and Landon Shaw (Engineer, TPNRD). The private industry expert is Jim Cannia (Geologist with Aqua Geo Frameworks).*

*Duane Woodward, Central Platte NRD (Grand Island, NE)*

- 1. Will providing funding and in-kind services no various tasks*
- 2. Project support and is involved on a day to day basis with the COHYST modeling effort.*

*Landon Shaw, Twin Platte NRD (North Platte, NE)*

- 1. Project support with AEM collection.*
- 2. Project review and information application.*

*Jim Cannia, Aqua Geo Frameworks (Mitch, NE)*

- 1. Manage and contract for AEM data acquisition*
- 2. Manage and create GIS databases*
- 3. Manage and work on Geophysical analysis*
- 4. Manage and Develop Hydrogeologic framework with report*

#### 4. Other Sources of Funding

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

*The total cost of the project is \$966,000 which includes a request of 579,600 from WSF. The NRD's will provide the remaining funds. The CPNRD 2015/ 2016 FY property tax collected was \$6,115,709.65 and the current tax level is 0.003842 on a valuation of \$15,919,152,725.00. The CPNRD has \$117,400 budgeted for the project this year and will budget the remaining \$56,480 the next budget year for this project. The CPNRD letter of support has been included with this application in an attachment. The TPNRD 2015/ 2016 FY property tax collected was \$2,632,300.00 and the current tax level is 0.006305 on a valuation of \$5,684,667,823.00. The TPNRD has \$163,600 budgeted for the project this year and will budget the remaining \$48,920 the next budget year for this project. The TPNRD letter of support has been included with this application in an attachment.*

#### 5. Support/Opposition

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

*Support for the project includes the CPNRD manager and TPNRD manager plus the engineering staff. This project has developed based on the discussions of CPNRD and TPNRD staff with Jim Cannia from Aqua Geo Frameworks. We have not heard of any opposition to this project at this time.*