

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Groundwater Management program review for Water Sustainability

PRIMARY CONTACT INFORMATION

Entity Name: Central Platte Natural Resources District

Contact Name: Duane Woodward

Address: 215 Kaufman Ave Grand Island, NE

Phone: 308-385-6282

Email: Woodward@cpnrd.org

Partners / Co-sponsors, if any: USGS Water Science Center Lincoln

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

Grant amount requested. \$ 249,900

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

Obtained: YES

NO

USACE (e.g., 404 Permit) N/Ax Obtained: YES NO

Cultural Resources Evaluation N/Ax Obtained: YES NO

Other (provide explanation below) N/Ax Obtained: YES NO
[Click here to enter text.](#)

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

YES NO

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

YES NO

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

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

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

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

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

N/A YES NO

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

YES NO

If yes, have any changes been made to the application in comparison to the previously submitted application? [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 1st.

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? \$ 0

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. [Click here to enter text.](#)

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 1st for which you are asking cost share assistance from this fund.
\$ [Click here to enter text.](#)

Section B.

DNR DIRECTOR'S FINDINGS

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

YES NO

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

A discussion of the plan of development ([004.01 A](#));
Click here to enter text.

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

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

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

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

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

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

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

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

A discussion of the plan of development ([004.02 A](#));

The CPNRD Groundwater Management Plan and Rules and Regulations, were developed in the 1980s, and will be updated using much more recent data and the latest in scientific approaches. While the original work was sound and well-conceived for its time, as of today (2015) it is in need of update; the technology used in those studies, and thereby influencing the development of the plan, is obsolete. A number of newer groundwater flow models have been

constructed, the most recent of which published by the Cooperative Hydrology Study (COHYST2010; July 2013), would represent a substantial upgrade in technology supporting the CPNRD GW Plan and Rules and Regs. In addition, current COHYST 2010 groundwater models are based upon 10-year old modeling code (MODFLOW-2005), and can also be updated to provide the latest technology for CPNRD, ensuring the longevity of the new GW Management Plan and Rules and Regs. Recent modeling codes developed by researchers at the U.S. Geological Survey, would upgrade the solution technique, and provide for full-coupling of the simulation of landscape hydrology with the groundwater flow simulation, a substantial increase in the realism and comprehensiveness of the simulation approaches.

A description of field or research investigations utilized to substantiate the project conception (004.02 B); The previous CPNRD Groundwater Management Plan and rules were based in part upon groundwater flow modeling done by Peckenpaugh and others, 1987 (U.S. Geological Survey Water Resources Investigations Report 87-4176), later modified by consultants from HDR, Inc., hired by CPNRD. The previous model boundary was along the Platte River, so the model did not even cover the entire NRD in Dawson County and Southern Hall County. The CPNRD Groundwater management plan outlined specifies 24 different areas for management and employs a Phased approach to decreasing irrigated lands to maintain aquifer levels. Aquifer drawdown levels were based upon sustainable development forecast by the groundwater model and were specified for each of the 24 areas, with aquifer drawdown causing additional management, Phase II, when 50% of the groundwater level decline is reached, Phase III when 70% is reached, Phase IV when 90% is reached, and Phase V when 100% is reached. Percentage decreases in lands irrigated for each Phase is based on the “Predicted Stable Rotation Percent” established by modeling analysis. During the establishment of criteria for the IMP in 2009 the aquifer drawdown level of 25% limits acres transfers in the 24 management areas. Triggers in the existing plan were based primarily upon aquifer drawdown from the 1982 baseline. For instance, for an area with a 30 ft maximum allowable decline, Phase II management actions would start at 15 ft. It is envisioned that these aquifer drawdown levels, and “Predicted Stable Rotation Percents”, would be re-evaluated during the course of this project, with the newer models using more recent data and approaches.

The current version of COHYST (2010) is meant to provide quantitative tools to predict the response of the Platte River in central Nebraska and of the surrounding aquifer, to changes in water management and use. This version of the model uses a Hydrologic Water Budget approach and was a substantial improvement from the models upon which the CPNRD GW management plan and rules and regs were based. COHYST 2010 used data collected as recently as the 2010. The current COHYST models include separate and sequentially-coupled surface water, groundwater, and watershed models, each of which represents a separate portion of the hydrologic cycle or related processes. The three models are sequentially coupled, meaning that each model is run separately and the coupling occurs through data transfer, that is, outputs from one model, become inputs for another model, and so on. However, recent advances in simulation techniques developed by U.S. Geological Survey Research Hydrologists, provide methods for fully-coupling landscape hydrology (surface processes, runoff, estimation of plant water use, and much more) with the groundwater system, so that all portions of the hydrologic cycle are simultaneously solved (fully-coupled).

*The recently published integrated modeling code, referred to as MODFLOW-One Water Hydrologic Model, or MODFLOW-OWHM, will be used to update the COHYST models. The One-Water Hydrologic Flow Model (MF-OWHM) is a MODFLOW-based integrated hydrologic flow model (IHM). MF-OWHM is designed for the analysis of a broad range of conjunctive-use issues. Conjunctive use is the combined use of groundwater and surface water. **MF-OWHM allows the simulation, analysis, and management of human and natural water movement within a physically-based supply-and-demand framework.***

MF-OWHM is based on the Farm Process for MODFLOW-2005 (MF-FMP2, [Schmid and Hanson, 2009](#)) that is now combined with Local Grid Refinement (LGR, [Mehl and Hill, 2013](#)) for embedded models to allow use of the Farm Process (FMP) and Streamflow Routing (SFR) within embedded grids. MF-OWHM also now includes new features such as the Surface-Water Routing Process (SWR, [Hughes and others, 2012](#)), Seawater Intrusion (SWI, [Bakker and others, 2013](#)), and Riparian Evapotranspiration (RIP-ET, [Maddock III and others, 2012](#)). MF-OWHM contains all the

previously available solvers and the new solvers such as Newton-Raphson (NWT, [Niswonger and others, 2011](#)) and the nonlinear preconditioned conjugate gradient (PCGN, [Naff and Banta, 2008](#)).

What makes MF-OWHM unique is that it allows the simulation of head-dependent flows, flow-dependent flows, and deformation dependent flows that collectively affect conjunctive use of water resources. The supply-constrained and demand-driven framework combined with the linkages among packages and processes provides relations of water use and movement, and helps to prevent mass loss to an open system thus facilitating the accounting for "all of the water everywhere and all of the time."

In addition, the current (2010) COHYST models were built with a single vertical layer representing the varied geology present in the aquifer, whereas earlier COHYST models published by 2007, used multiple hydrostratigraphic units to define groundwater model layers, such as for the lower Ogallala Group silt and clay, main Ogallala Group aquifer, upper Ogallala Group silt and clay, lower Quaternary silt and clay, main Quaternary aquifer, and upper Quaternary silt and clay (or loess) frequently present at land surface. It is not known whether representing the varied geologic units with a single layer will provide a high enough level of accuracy for CPNRD GW Management needs. The impact of simulating the aquifer in the CPNRD with multiple geologic layers as opposed to a single vertical layer, needs to be evaluated in order to determine, which approach provides the necessary accuracy for CPNRD groundwater management. The CPNRD is also developing a Geophysical data collection project for Dawson County that would provide improved definition of the geology for use in a multiple layer or single layer model.

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](#)).

The CPNRD Groundwater Management Plan and related Rules and Regulations will be updated using the latest and most comprehensive science available to support hydrologic water budget management. Update of these regulations will directly improve CPNRD ability to protect and maintain sustainable groundwater resources in the area now and for future generations, and improve Phased management implementation used to specify when management or regulation of groundwater resources is necessary.

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative. *NA-- This project is focused on using the Technical expertise of the USGS Water Science Center in Lincoln and their Cooperative Water Program funds to include Federal dollars in the project.*
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). *The estimate of the project cost for the next 3 fiscal years (2017 thru 2019) is \$576,700.00. The 3 year cost includes \$249,900 from WSF, \$165,000 from CPNRD, and \$161,800 from USGS Cooperative Water Program.*
 - 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 groundwater management with-in the CPNRD 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). NA

4. Provide evidence that sufficient funds are available to complete the proposal. *CPNRD will contribute \$165,000 over the duration of this project, and the U.S. Geological Survey will contribute \$161,800 in Federal matching funds, over and above the requested match funds requested in this application. 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 will budget the \$165,000 during the next 3 years for this project. The USGS letter of support has been included with this application in attachment 1.*

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.
NA

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

The States 88th Nebraska Legislature changed the State's Groundwater Management and Protection Act through LB 1106 to require Natural Resources Districts to prepare a Groundwater Management Plan. This was completed for the CPNRD in December 1985. That Plan has been in place and revised several times since 1985. The latest revision was the addition of the Integrated Management Plan in July 2009.

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

The project this application supports is the review and update of the Technical modeling work that supported the CPNRD 1985 GWMP. The 1985 GWMP was developed using Groundwater Model and Technical Information developed by the USGS (J. Peckenpaugh, 1983) and the model application by HDR Inc. Since then the Cooperative Hydrology Study (COHYST 2010) has developed new modeling tools for

the CPNRD area and they have been use in the IMP process and the CPNRD's Water Banking process. This project would study using current and an updated version of the COHYST technical information and modeling to update the 1985 GWMP technical analysis used in developing a updated Management Plan.

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 Groundwater Management and Protection Act Legislative statutes 46-701 thru 46-756 provides the CPNRD authority to have and update their GROUNDWATER MANAGEMENT PLAN for the benefits of protecting Natural Resources of the NRD and State. The CPNRD also 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 CPNRD'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. *Re-evaluation of the existing groundwater management plan in conjunction with the Integrated Management Plan, will result in updated rules and regulations based upon the latest and most advanced science that can be applied. These updated rules and regulations are designed to protect and maintain groundwater resources in the CPNRD, but will also thereby, maintain groundwater flows to surface water, wetlands, or any other inter-related flows that support environmental or ecological concerns.*

Section C.

NRC SCORING

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

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

Notes:

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

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

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

The drinking water supply within the CPNRD comes from the High Plains aquifer. The groundwater quantity and quality can be maintained through continued implementation of a Groundwater Management Plan. The 2010 population within the

CPNRD area is approximately 112,000. The 3 largest municipal cities in the NRD are Grand Island 48,000, Kearney 31,000, and Lexington 10,000 they each utilize pumping wells near the Platte River to supply domestic and industrial uses of water. Thus it is very important to have a Groundwater Management Plan that continues to manage and maintain the groundwater aquifer along the Platte River and though out the NRD. This project will address the Technical information and modeling analysis that supports sustainable GW quantity management into the future. It will help support Groundwater Management within the CPNRD and help avert the need for projects to remediate and mitigate drinking water supplies.

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.

CPNRD GW MANAGEMENT PLAN, dated December 1985 is the plan being addressed by this project. Previous modeling by Peckenpaugh (USGS) and subsequent analysis, were used to establish trigger levels of groundwater decline based upon investigated sustainable levels of development. The goals and objectives of the groundwater management plan remain the same since, 1985, and are to assure an adequate supply of water for feasible and beneficial uses through proper management, conservation, development and utilization of the District's water resources. CPNRD is involved in groundwater level observations, administering irrigation runoff regulations, groundwater quantity and quality management, groundwater modeling and development of a surface water flow model which will all lead to a complete groundwater and surface water management program. The purpose of the project proposed in this application is to review and update the Technical Information and Analysis to refine and update the rules established in the original plan using current data and the latest scientific approaches. This project will benefit the groundwater management plan by verifying and updating the original triggers and approaches to triggers, using the latest data and scientific approaches, providing increased accuracy in the assessment of future water availability with or without various management actions, and increased certainty in the models themselves and in the water availability forecasts generated by the models.

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

List the following information that is applicable:

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

The area in which the benefits will be realized is the CPNRD. The Groundwater Management Plan to be revised through this study is meant to preserve groundwater sustainability, and under certain conditions may include reductions in groundwater withdrawals, reducing stream depletion to the Platte River and to perennial tributary reaches of the Platte River, primarily within the CPNRD, approximately from Gothenburg to Columbus. The timing considered will be a future 50-year analysis period to be analyzed using the models revised during the course of this study. The amount of reduction in stream depletion could range up to thousands of acre-feet per year, depending upon the level of management determined for the updated groundwater management plan. Based on current modeling and analysis groundwater withdrawals in the CPNRD are around 550,000 acre-ft per year, with related stream depletion to the Platte River and its tributaries of about 30,000 to 50,000 acre-feet per year. The opportunities for GW Management in CPNRD are very good based on the 4.7 million acre-feet per year of precipitation received and 1.3 million acre-feet per year of surface water inflow. Re-evaluation of the CPNRD GW Management Plan will help determine the potential to increase recharge and analyze the opportunities to reduce or retime the depletions to the Platte River, or at a minimum, maintain current depletions rates based on the fully appropriated level of development for CPNRD.

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

This project will update the Technical information and modeling analysis for the CPNRD Groundwater Management Plan (GWMP), The main goal of the GWMP is to provide water supply sustainability for all groundwater uses including agriculture, municipal, industrial, and baseflow returns for integrated management uses. The updated GWMP project will provide benefits by having new or up to date management rules and regulations. The long range forecast for a updated GWMP would be to maximize the many benefits of precipitation that falls within the NRD area, and groundwater or surface water that flows into the NRD.

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.

Improved decision making tools, like those being updated for the GWMP can help maintain or increase beneficial uses of our water resources by providing for a legally and scientifically defensible means to sustainably water resources management. The project seeks to provide a hydrologic water budget approach to the GWMP technical analysis which can results in preserving or enhancing the current beneficial uses across the NRD. Current beneficial uses within the NRD include domestic and industrial water supply for a population of 112,000, plus irrigation water supply for 1 million irrigated acres, and over 1 million acre-feet of water in the Platte River annual for recreational and wildlife habitat use. The proposed project is directly beneficial to CPNRD and Nebraska residents by helping to maintain groundwater supplies that are directly tied to the long-term agricultural sustainability, domestic water use sustainability, and sustainable Platte River flows.

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 project will cost \$576,700 in total between grant funds, CPNRD funds, and USGS funds, but the groundwater resources in the CPNRD, which will be maintained and preserved through this work, support multiple interests, including: 1) municipal water supplies of nearly 780,000 residents of Nebraska (CPNRD, Lincoln, and Omaha); 2) ethanol production totaling \$559 million per year (265 million gal/yr); 3) agricultural production of over \$2 billion per year within CPNRD. Hence, the cost of the study, and the \$249,900 requested from the grant, are only a very small fraction of the value of the resources supported by groundwater in the CPNRD, which will be preserved and maintained through this work.

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 Platte River Program has benefited from the current CPNRD GWMP and will continue to benefit from an updated Plan. The Platte River Program developed from a 3 state (NE, CO, & WY) and federal government (USFWS & USBR) cooperative agreement. One of Nebraska's obligations under the Program is to return to 1997 development levels for Groundwater and Surface Water uses. The CPNRD has developed an Integrated Management Plan as part of their GWMP to help the State meet the obligations for the Program. The difference between the current development and 1997 development could be determined with the updated Modeling tools and information for the GWMP. The goal of the GWMP is maintain a sustainable GW aquifer which is important for Program goals of conjunctively managing groundwater and surface water to improve habitat for endangered and threatened species.

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.

The groundwater aquifer in the CPNRD supports public drinking water, industry, and the agricultural economy of the CPNRD, and as such can be considered critical infrastructure. Groundwater provides drinking water for over 112,000 residents of the CPNRD as well as contributing to the downstream cities of Lincoln and Omaha (population 667,337), whose well fields in the lower Platte River alluvium, are recharged through river flows in part supplied by groundwater discharge to the Platte River, occurring within the CPNRD. Access to high-quality drinking water is a fundamental aspect of public health and safety. Value of related cost savings is difficult to assess, but if the affected population instead drank 2 bottles of water per day at a cost of \$2 per bottle, the cost would be more than \$3.1 million per day.

9. Improves water quality;

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

- Describe the history of the water quality issue including previous attempts to remedy the problem and the results obtained.

The project of updating the Technical analysis and information for the Groundwater Management Plan does not have a direct benefit to improving water quality. The current Groundwater Management Plan does have a Water Quality component that has been applied across the CPNRD since 1987 to improve groundwater quality by reducing nitrates leached into the aquifer. Some of the information for the GWMP update like irrigation system type and location of conservation tillage practices within the NRD may have indirect benefits for future water quality management actions.

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 Central Platte NRD is the local jurisdiction supporting the project. The FY 2015 /2016 Tax Levy for CPNRD is 0.03842, the property tax valuation is \$15,919,152,725.00, and the property tax collected is \$6,115,709.64. The USGS is also contributing funds to this project from their Cooperative Water Program. Cost share in the amount of \$161,800 for the 3 years is available and being programmed by the USGS.

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. The results of the project are improved Technical analysis and information, which will improve the CPNRD's groundwater management plan. Groundwater Management Plans are developed to implement and support sustainable water use. The history of work and goals and objectives of this project are provided in Section B item 1b above. The stakeholders involved in the include CPNRD staff and board, producers and Irrigation

Districts in the CPNRD area that use surface water and groundwater, city staff and industrial owners that use groundwater. Therefore, this project directly benefits all the producers, irrigators, ethanol producers, cities, industry, municipal and domestic groundwater users within the 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.

This project will help manage and preserve groundwater resources in the CPNRD. Maintaining groundwater resources in the CPNRD will benefit baseflows to the Platte River and its tributaries which support Platte River Program issues (a statewide issue) by maintaining and increasing the amount of water in the Platte River. The project will similarly benefit stakeholders in the Lower Platte River Basin, and help maintain Platte River flows that recharge municipal well fields for the cities of Lincoln and Omaha, population of over 667,000, which is also a statewide interest.

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 USGS Nebraska Water Science Center is contributing \$161,800 in federal matching funds to this project, over and above the funds that will be contributed by CPNRD and the requested grant funding. The Cooperative Water Program from USGS will be used by the USGS staff conducting the project work. Attachment 1 is a letter of support from the USGS Lincoln office with their funding commitment.

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 CPNRD GWMP which will focus on the Central Platte River Hydrologic Water Budget and develop scientific updates of Technical analysis and information. The tools and analysis develop with this project can be used to assess current and future watershed health. The watershed included in the CPNRD GWMP area is the Central Platte River and it’s tributaries from Gothenburg, NE to Columbus, 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 research updating Technical analysis and information for the CPNRD GWMP. That research will start with COHYST 2010 models and look at groundwater modeling program updates along with new GWMP analysis.

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.

NA

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 objective of the project is to update the science upon which the Central Platte Natural Resources District Groundwater Management Plan is based. The current plan was developed in the 1980s, using groundwater aquifer drawdown levels and forecast sustainable agricultural development, based upon groundwater models also developed in the 1980s. However, since that time, much additional data has been collected, and many newer models exist, such as from the COHYST study. In addition, newer modeling approaches have been developed by researchers at the USGS that will further advance the state of the science used for CPNRD GW management. The COHYST models will be evaluated for the purposes of updating the CPNRD GW Plan and updated to the latest scientific approaches. Aquifer drawdown levels will be re-analyzed using the updated models / tools, to provide information about potential future water availability that can be used to update the CPNRD Groundwater Management Plan.

2. Project Tasks and Timeline

Background for Project Task

The current Ground Water Management Plan was adopted and went into operations in 1985 (see attachment "CPNRD_GWM_volumel.pdf"). The Plan delineated 24 management areas across the NRD (see map in attachment "GWMP_Acres_past&present.xlsx"). The Plan also implemented a Phased approach to maintaining a sustainable groundwater system. The Phased controls included decreasing groundwater irrigated acres based on a Stable Rotation Percentage if Aquifer declines were approaching maximum acceptable declines for a management area. The good news is we are still in Phase I and the 24 management area aquifer drawdown's since 1982 (baseline) have not exceeded 50% of the maximum acceptable decline which would move areas into Phase II. Attachment "2015 GWM Graphs.pdf" shows the accumulated change in Aquifer increases and decreases for the 24 management areas and the overall district change. From the graphs one sees management areas 9 and 16 moving toward Phase II implementation. The CPNRD staff when reviewing how a Phase II cut back in irrigated acres would get implemented noted some of the 1985 modeling work on estimating Stable Rotation Percentage needed further review and updating. The CPNRD staff also noted some of the irrigated land use changes from the past analysis and the present COHYST work (see past & present spreadsheet attachment) which also supports updating the GWMP technical

analysis and information. To accomplish this work the following Project Task and timeline were discussed and outline;

Year 1: Evaluate existing groundwater models as tools for updating CPNRD Groundwater Management Plan. Evaluate the effects of using a single vertical layer to represent varied hydrostratigraphic units that were mapped as part of COHYST study. Evaluate past and present hydrologic data for the project including land use changes, irrigated acres data, ground water aquifer structure and properties, groundwater level changes, groundwater pumping and comingled surface water pumping, stream bed conductance information, etc. Year 2: Update available models to latest integrated modeling approach (MODFLOW-One Water Hydrologic Model). Calibrate historic period of OWHM model using measured hydrologic data (stream flows and groundwater levels, other as applicable). Construct models of various future conditions for forecasts of water availability. Year 3: Analyze future forecasts of water availability under various conditions to revise aquifer drawdown levels for CPNRD Groundwater management areas, sustainable levels of groundwater use development, and any analyses needed to update the CPNRD GW Management Plan. Write, revise, and publish U.S. Geological Survey Scientific Investigations Report documenting study.

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.

Central Platte NRD will provide overall project oversight and guidance as to the specific analyses that need to be conducted to update the GW Management Plan. The USGS Nebraska Water Science Center (also a funding partner) shall collaborate with CPNRD staff on evaluation of currently existing tools, updates to existing tools, using the updated tools to perform the analysis necessary to update the GWMP, and production of a report documenting the updated integrated models and analyses. No other sources of funding were considered at this time. The project will also rely on NDNR and other COHYST Sponsors as a source for technical information and data for this project.

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 for the next 3 years is \$576,700. We are requesting \$249,900 from the WSF and the CPNRD is contributing \$165,000 and the USGS \$161,800. The Central Platte NRD is the local jurisdiction supporting the project. The FY

2015 /2016 Tax Levy for CPNRD is 0.03842, the property tax valuation is \$15,919,152,725.00, and the property tax collected is \$6,115,709.64. The USGS is also contributing funds to this project from their Cooperative Water Program. Cost share in the amount of \$161,800 for the 3 years is available and being programmed by the USGS. The USGS and CPNRD will support this project with annual budgeting each year. The USGS funding is supported by their attached letter of support (see attachment 1). If the project is not funded through this WSF grant request we would probably apply for another WSF grant in the future or maybe apply for a NET grant.

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 hydrologist plus the USGS Lincoln office Water Science Center director and hydrogeologist staff. This project has developed based on the insight and discussion of CPNRD staff. The USGS Water Science Center was brought into the project discussion because of their expertise in groundwater modeling including the latest MODFLOW models, multi-layer modeling, farm process modeling, etc. We have not heard of any opposition to this project at this time.