

# NEBRASKA NATURAL RESOURCES COMMISSION

## Water Sustainability Fund

Application for Funding

Section A.

### ADMINISTRATIVE

**PROJECT NAME: Driving Water Savings Through Advanced Data Collection and Modeling in the Twin Platte Natural Resources District**

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

Sponsor Business Name: **Twin Platte Natural Resources District**

Sponsor Contact's Name: **Kent Miller**

Sponsor Contact's Address: **PO Box 1347, North Platte, Nebraska 69103**

Sponsor Contact's Phone: **(308) 535-8080**

Sponsor Contact's Email: **komiller@tpnrd.org**

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

**Grant** amount requested. \$ **1,654,860**

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

**If a loan is requested** amount requested. \$ **0**

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

2. **Neb. Rev. Stat. § 2-1507 (2)**

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

**If yes:**

- Do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality? YES  NO
- Attach a copy to your application. **N/A**
- What is the population served by your project? **N/A**
- Provide a demonstration of need. **N/A**
- **Do not complete the remainder of the application.**

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

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

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

4. **Partnerships**

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

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

**N/A**

5. **Other Sources of Funding**

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

**Project costs that are not covered by a Water Sustainability Fund (WSF) grant will be paid for by the Twin Platte Natural Resources District (TPNRD) (see Table 1). Funding from the TPNRD has been confirmed (see Attachment A).**

*Table 1 Project costs and funding sources*

Year	WSF Grant	TPNRD Portion	Project Cost
1	\$583,680	\$389,120	\$972,800
2	\$569,460	\$379,640	\$949,100
3	\$402,420	\$268,280	\$670,700
4+	\$99,300	\$66,200	\$165,500
<b>Total</b>	<b>\$1,654,860</b>	<b>\$1,103,240</b>	<b>\$2,758,100</b>

6. **Overview**

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

Following the passage of LB962 in 2004, the TPNRD and the Nebraska Department of Natural Resources (NDNR) jointly adopted an Integrated Management Plan (IMP) in 2009 which provided for an initial 10-year increment of joint planning activities. During this 10-year increment two overarching activities were carried out:

- 1) The TPNRD implemented various activities to provide offset water to the Platte River in amounts specified in the original IMP, and
- 2) The TPNRD and the NDNR completed a Robust Review as outlined in the IMP in order to reassess the amount of offset water the TPNRD should be required to provide in order to achieve the Goals and Objectives of the IMP.

Of significance to the Robust Review was the substantial level of redevelopment of the modeling tools used to compute the TPNRD offset water requirement that was completed after the original estimates were determined. While the current modeling tools are considered a marked improvement over the original models, several questions arose upon completion of the Robust Review regarding the effect of several key assumptions on the results. Furthermore, a study of the effect of conservation measures such as conservation tillage indicated that the widespread adoption of these measures may significantly alter the amount of offset water that should be required. These conservation measures are not currently considered in the Robust Review methodology.

A key shortcoming of the previous management strategy that was identified by stakeholders consulted in development of the second increment IMP was that actual water use was not being directly measured in any way. Moreover, the lack of direct measurements of water use caused the need for the above-mentioned key assumptions embedded in the current Robust Review methodology. After careful consideration of the different options, the TPNRD and the NDNR

agreed that the approach of this project would significantly improve water management efforts in the TPNRD and provide a superior approach to completing the next Robust Review currently scheduled for 2023. The basic components of this new Robust Review method are:

- 1) Leveraging power usage data as an indicator of groundwater pumping,
- 2) Calibration of the power record data against direct pumping rate measurements to compute an estimate of actual groundwater pumping,
- 3) Refinement of the methodology used to compute the crop demand and consumption of groundwater due to irrigation in the TPNRD, which is the key driving factor underlying the results of the Robust Review, and
- 4) Automation of these and other computations to ease future levels of effort required and to significantly improve water management capabilities.

The approach to completing the first two of these components is relatively straight-forward and would utilize practices that have already been developed and implemented. However, the mechanics behind the Robust Review will be significantly upgraded over the course of this project. The Groundwater Evaluation Toolbox (GET), a groundwater modeling platform, will be upgraded and leveraged to automate completion of the computations required to complete the Robust Review. This will facilitate both the testing of various methods for computation of irrigation water budgets and the efficiency of completion of future Robust Reviews. All data collection, processing, and execution of model simulations required for future Robust Reviews will be fully automated for the TPNRD and the NDNR, providing annual to daily scale feedback to water managers and irrigators. This project will educate the irrigator on how their groundwater use affects the hydrologic system, encouraging them to optimize their operations. Both the TPNRD and the irrigator will be working together to strike the appropriate balance between maximum beneficial consumptive use and limiting adverse impacts to the aquifer and streamflow. This will provide a true paradigm shift to irrigators and managers in the TPNRD, empowering them to make proactive water management decisions by understanding how an action can affect the aquifer and stream before they take it. This will transform the reactive water management process from the past into a proactive approach for the future.

A list of acronyms used throughout this application is included as Attachment B.

## 7. Project Tasks and Timeline

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

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

<u>Tasks</u>	<u>Year 1\$</u>	<u>Year 2\$</u>	<u>Year 3\$</u>	<u>Remaining</u>	<u>Total \$ Amt.</u>
Permits	\$18,000				\$18,000
Engineering		\$96,000			\$96,000
Construction		\$87,000	\$96,000		\$183,000
Close-out				\$8,000	\$8,000
				<b>TOTAL</b>	<b>\$305,000</b>

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

**This project will involve the development and delivery of a software solution that will allow the TPNRD to track agricultural groundwater use in their NRD. The project will be completed over the course of four years. During Years 1-2, flow**

rate testing of wells in the TPNRD will be completed by local well drilling companies. AgHub is a geospatial farm operation data platform that will be used by growers in the TPNRD to store and track data related to their farming practices. AgHub will also give the TPNRD estimates of water use across their District in real-time. Development of AgHub will occur in Year 1, with continuous improvements being made to the platform over the following two years.

Evaluation of existing data and data supplied by the AgHub platform will be front-loaded in Year 1, with less effort required in Years 2-4. Watershed and groundwater model runs will be completed in Years 1-3 leading up to the Robust Review. The Robust Review will be completed in Year 4 and serve as the official measure of progress the TPNRD has made in meeting their second increment IMP goals and objectives. The total project cost after four years is estimated to be \$3,415,000. The TPNRD will cover 100% of the costs that will be incurred prior to the approval of the application, which totals \$656,900. This brings the total cost of the portion of the work that falls under the WSF down to \$2,758,100, of which the TPNRD will cover 40% of the cost and the WSF would cover 60 % of the cost.

*Table 2 Major project task costs and timeline*

Tasks	Year 1	Year 2	Year 3	Remaining	Total \$ Amt.
Flow Rate Testing	\$278,400	\$278,400	\$0	\$0	\$556,800
AgHub Development	\$425,000	\$425,000	\$425,000	\$0	\$1,275,000
Evaluation of Data/Tools	\$107,000	\$29,900	\$22,700	\$17,100	\$176,700
Modeling	\$162,400	\$215,800	\$147,000	\$0	\$525,200
Robust Review	\$0	\$0	\$76,000	\$148,400	\$224,400
				<b>TOTAL</b>	<b>\$2,758,100</b>

8. **IMP**

Do you have an **Integrated Management Plan** in place, or have you initiated one? YES  NO  Sponsor is not an NRD

## Section B.

### DNR DIRECTOR'S FINDINGS

#### **Prove Engineering & Technical Feasibility**

(Applicant must demonstrate compliance with Title 261, CH 2 - 004)

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

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

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

- 1.A.1 Insert a feasibility report to comply with Title 261, Chapter 2, including engineering and technical data; **N/A**
- 1.A.2 Describe the plan of development (004.01 A); **N/A**
- 1.A.3 Include a description of all field investigations made to substantiate the feasibility report (004.01 B); **N/A**
- 1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); **N/A**
- 1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D); **N/A**
- 1.A.6 Discuss each component of the final plan (004.01 E); **N/A**
- 1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); **N/A**
- 1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2); **N/A**
- 1.A.9 When applicable include the criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). **N/A**

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

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

**A list of acronyms used throughout this application is included as Attachment B.**

**The TPNRD will be working with a team of water and software experts to complete this project. That project team will build a platform to enable the TPNRD to track water usage by irrigators and model how that water use affects stream baseflows. Both the AgHub platform and the modeling platform in GET will be designed and built to fulfill the needs of producers in the District and staff at the TPNRD.**

**AgHub is a platform that is developed by the Grower Information Services Coop (GiSC). AgHub is a geospatial farm operation data platform that will be used by producers in the TPNRD to track data related to their farming practices. AgHub will be used by the TPNRD to track real-time water use estimates calculated using power records. GiSC has successfully deployed AgHub for producer use across the United States. To adapt the current AgHub infrastructure to the TPNRD, GiSC will be incorporating GIS databases the TPNRD has maintained like certified irrigated acres and well registration information.**

**Flow rate testing will be completed across the District to verify well flow rates obtained from registration records. The TPNRD has contracted local well drilling companies to complete testing of the majority of irrigation wells in the TPNRD. The verified flow rate and electrical records from power companies will be used to estimate water use. Power companies in the TPNRD have Smart Meters, which send usage data automatically in timed increments. Electrical records have been effectively used to estimate water use in other areas of Nebraska, like in the Republican River Compact Accounting groundwater model. Data transfer from the power companies to the AgHub platform will be automated and occur daily.**

**Crop type and water use data from AgHub will be used as input data in the watershed model hosted on the GET platform. GET will communicate with AgHub via an application programming interface (API). The watershed model will also include integration of daily precipitation from the nationwide PRISM dataset. PRISM data is available at an 800-meter resolution to allow for daily precipitation estimates at a field-scale. The watershed model will synthesize this data and output the appropriate MODFLOW files. MODFLOW is a numerical finite-difference groundwater model developed by the United States Geologic Survey. After the groundwater model is run, output files will be translated into easy-to-understand charts and graphs that show impacts to baseflow and water level changes as a result of the producer's water use across the TPNRD.**

**The TPNRD currently uses GET to run their groundwater models including the Cooperative Hydrology Study (COHYST) model. They can evaluate management actions like adding or removing a well, transferring irrigated acres, and simulating intentional recharge activities. The COHYST model is the tool used by NDNR to measure the TPNRD's progress toward meeting their IMP goals. GET will be set up to consecutively pull water use data from AgHub, run the watershed model, and then run the groundwater model. This process will be fully automated and allow the TPNRD to track how their water use affects the aquifer and baseflow in real time.**

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

The TPNRD has entered into a four-year contract with GiSC for the development of AgHub and onboarding of producers in the platform. GiSC will be hosting open houses and attending county fairs to get producers to sign-up for AgHub in 2019 and early 2020. Coordination with power companies to obtain electrical data from Smart Meters has been initiated with early success. GiSC and TPNRD are already working on setting up AgHub for a group of beta users across the District.

Gothenburg Irrigation, Alf Well Drilling, Irrigation Technology Inc., Sargent Irrigation Co., Downey Drilling Inc, and Grosch Irrigation Co. have all been contacted by the TPNRD to perform well flow rate testing. Bids to complete the work have been approved by the TPNRD Board of Directors. Flow rate testing will commence at the end of the growing season in 2019. This work is anticipated to conclude in 2022.

Olsson will be coordinating with GiSC and NDNR to incorporate the data gleaned from AgHub and flow rate testing into a refined watershed model and groundwater model. These models will be housed in the GET platform, where the TPNRD will have the ability to run their own simulations. Olsson will be working on the “proof of concept” platform to show preliminary model results by the end of 2020. These initial results may contain several assumptions that will be replaced with actual data as development continues. Establishment of the data transfer pathways to create a daily record of water use across the TPNRD will be the major goal of the 2020 simulations. Included in the development of the initial modeling tools will be an extensive review of existing watershed models, groundwater models, soil-water balance studies, and available climate input datasets of the area. Datasets hosted in the Google Earth Engine will be part of this review.

Improvements will be made to the existing GET architecture to allow for a nearly unlimited ability to run different types of water management scenario simulations. Olsson will be working with Don't Panic Labs, a software development company, to make these improvements. The GET architecture will be converted to a “sandbox” environment. This will allow Olsson to write their own scripts according to the TPNRD's needs that can make any desired changes to watershed and groundwater model files. Adding this ability to GET will elevate the platform to an extremely powerful modeling tool that can be used by the TPNRD to complete their Robust Review in-house.

A major advantage of the sandbox environment will be the use of an API to interface directly with AgHub and any pertinent datasets hosted on the internet. The PRISM dataset has been identified as a source of daily precipitation data that could be incorporated into the watershed model using an API. Olsson has also had preliminary discussions with the creators of OpenET, a platform in development to provide open and easily accessible evapotranspiration (ET) data



to the public. Completion of the OpenET platform is tentatively scheduled for 2020, coinciding with the release of initial modeling results. The project team of OpenET includes leading national and international experts in remote sensing of ET, cloud computing, and water policy. They will be a valuable resource to consult when calculating potential ET as an input for the groundwater model.

After the initial model run of 2020 is completed, Olsson will be working to improve on model uncertainty through rigorous sensitivity testing. This will aid in understanding the relative importance of the accuracy of various data and assumptions. This will be a collaborative process involving the TPNRD staff, NDNR technical staff, and Olsson modelers. Once sensitivity testing has been completed, official runs of the watershed and groundwater models will be conducted on an annual basis beginning in 2021. These annual model runs will help the TPNRD measure their progress toward fulfilling the goals of their second increment IMP.

Modeling simulations for the Robust Review will be completed at the end of 2023. The Robust Review will serve as the official indication of whether the TPNRD is on track to meet their offset requirements. New depletion targets for the TPNRD will be generated by this Robust Review and findings will be incorporated into the IMP.

For additional details on the plan of development, a work plan has been developed for this project (Attachment C).

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

While this project will serve to benefit the TPNRD in meeting their IMP goals, the producers in the District will also have improved access to water management tools. One objective of this project is to educate producers on how their farming practices affect the aquifer and nearby streams. This project is intended to illustrate the direct link between producer decision-making and the state of the water supply in the future—giving the producer a sense of empowerment. Access to this information is intended to promote water sustainability with the idea that by promoting awareness, producers will manage their water consumption as efficiently as possible. This idea has been substantiated by several studies relating to water management across the country. The following excerpts are provided to document a previous research investigation that can be used to support the project.

1. The scientific article entitled “Changing Learner Behavior through Environmental Education” by Harold R. Hungerford and Trudi L. Volk dated 1990 (see Attachment D) provides the following description:

***“As stated before, most educators firmly believe that, if we teach learners about something, behavior can be modified. In some cases, perhaps, this is true. However, in educating for generalizable responsible environmental behavior, the evidence is to the contrary. Typically, issue awareness does not lead to behavior in the environmental dimension. This means that we must look to a new model of instruction if behavior is important...If environmental issues are to become an integral part of instruction designed to change behavior, instruction must go beyond an ‘awareness’ or ‘knowledge’ of issues. Students must be given the opportunity to develop a sense of ‘ownership’ and ‘empowerment’ so that they are fully invested in an environmental sense and prompted to become responsible, active citizens...Citizenship behavior can be developed through environmental education. The strategies are known. The tools are available. The challenge lies in a willingness to do things differently than we have in the past.”***

2. The scientific article entitled “The Influence of Water Attitudes, Perceptions, and Learning Preferences on Water-Conserving Actions” by Damian C. Adams and others dated 2013 (see Attachment E) provides the following description:

***“Water conservation is an important natural resource issue, and the focus of a number of educational and extension programs. Inherent in many programs is the causal link between water facts and conservation behaviors that affect water quality and/or quantity. This article interprets the results of a survey on attitudes and perceptions of water resources (n=2226) from nine states (Alabama, Arizona, Florida, Georgia, Hawaii, Mississippi, Oklahoma, Tennessee, and Texas). The goal of the survey was to assess attitudes and perceptions of water supply, water quality, and factors affecting them. We assess the influence of attitudes and perceptions regarding the environment, water resources, governance, information sources, and demographics on water conservation behaviors. Specifically, we assess the role that these factors play in indoor and outdoor water-conserving actions indicated by respondents. We find several statistically significant non-knowledge factors that drive water conservation: perceived importance of water resources and their preferred use; preferred learning modes and information sources; interest in certain types of water issues; views on governance; general environmental attitudes; and demographics. For example, preferring passive learning modes (e.g. reading a newspaper article) negatively influences outdoor conservation, while preferring to learn by taking action (e.g. training) positively influences both indoor and outdoor conservation. These results highlight the importance of a number of non-knowledge factors in water program-related behavior change, and suggest a number of***

***factors that could inform targeted approaches to influence differing audiences.”***

- 1.B.4 Describe any necessary water and/or land rights (004.02 C); **N/A**
- 1.B.5 Discuss the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D).

**There are currently no known structural measures which may be affected by the project, however, the modeling platform developed for this project will provide the analysis tool upon which a number of structural projects may be evaluated in the future because of IMP requirements. Any projects that may impact streamflow and aquifer declines will need to be analyzed and projects specifically designed to improve streamflow will be assessed on their effectiveness.**

**The analyses that can be completed include examining the effects of certified groundwater acreage retirements, canal recharge projects, surface water consumptive use leasing, and/or detention for intentional recharge. These projects are designed to enhance streamflow or reduce groundwater level declines. The TPNRD will also use the modeling platform to simulate the effects of conservation land management practices (e.g. no till) on recharge.**

**Prove Economic Feasibility**

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

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

**The next best alternative to the development of this modeling platform would be to install flow meters on all active irrigation wells in the TPNRD. There are approximately 3,100 active irrigation wells across the District. To install flow meters, perform routine maintenance, and repair broken meters, both the TPNRD and the producer would incur significant costs. The TPNRD would need to hire full-time staff to operate their flow meter program and all pay associated personnel costs as they perform annual inspections.**

**By modeling this hypothetical flow meter program after existing programs in place at other NRDs, total program costs are expected to exceed \$12,900,000 in a 10-year period. This cost would be split between the TPNRD and the producer as the TPNRD would provide cost-share benefits for meter installation, repair, and maintenance.**

**A flow meter program would only accomplish a portion of the proposed project scope of work. Beyond just measuring water use, the next best alternative would**

need to include hiring a consultant to perform annual model runs to track the TPNRD's progress toward meeting their IMP goals. To perform model simulations at a similar level of detail as the proposed project, perpetual consultant costs could total at least \$250,000 per year.

The proposed project is not only significantly more cost effective, but also provides the TPNRD with an opportunity to more proactively manage their water and actively participate in the calculation of their offset requirements. With this modeling platform, the TPNRD can simulate management scenarios before they implement them, transforming this process from reactive to proactive decision-making.

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

As part of this project, the TPNRD and irrigators in the TPNRD will receive access to a software solution that tracks water use and the effect of water use activities on the aquifer and streams. This tool is inherently beneficial as it will encourage irrigators to optimize their operations to promote water sustainability. It will also give the TPNRD a means to evaluate potential water management actions before they take them—allowing them to choose the option with the highest water savings and lowest cost. This project has also been identified as the least cost alternative by a significant margin.

The TPNRD is required by their second increment IMP to offset post-1997 depletions to the Platte River. This project will fill a current void in their management tools by keeping them informed of their progress toward meeting their offset water requirements, rather than hoping these requirements are being met and taking reactive measures if they are not. This benefit cannot be quantified with a dollar value. However, the qualitative benefits are numerous. The quantity, quality, and availability of water use data will be improved. Irrigators will have access to a dashboard that allows them to track their farming practices and shows them how their activities affect the aquifer and streams through easy-to-understand charts and maps. The TPNRD will be able to evaluate management actions and save money by performing the analysis in-house and choosing the best alternative. This project will help Nebraska meet its requirements under the Platte River Recovery Implementation Program (PRRIP), which benefits all residents of the state. The use of the modeling platform will be essential to the TPNRD during their second increment IMP period over the next ten years. Perhaps more important are the long-lasting effects of the water management

**actions the TPNRD takes now. The benefits of this project will stretch far beyond the four-year project life.**

- 3.A Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01).

**The total project cost after four years is estimated to be \$3,415,000. The TPNRD will cover 100% of the costs that will be incurred prior to the approval of the application, which totals \$656,900. This brings the total cost of the portion of the work that falls under the WSF down to \$2,758,100, of which the TPNRD will cover 40% of the cost and the WSF would cover 60 % of the cost.**

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

**The primary benefit of this project will be the delivery of a software solution that will allow the TPNRD to efficiently and effectively track water use across the District. This tool will also help the TPNRD analyze the impacts of water use and to determine the extent to which those uses are sustainable without taking additional actions to manage water uses and supplies. Should proposed water management scenarios not be sustainable, the software solution will provide a tool for comparing the effects of other water management scenarios to aid in management decision making. This ability is essential to the TPNRD as they work to meet the offset requirements in their IMP and evaluate the effectiveness of their management actions on the offset requirements. This project will help the TPNRD meet their IMP goal to ultimately reach and maintain a level of water use that is sustainable over the long term.**

- 3.C Present all cost and benefit data in a table to indicate the annual cash flow for the life of the project (005.03). **See Attachment F.**
- 3.D In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.)

The TPNRD has several goals and objectives in their IMP and groundwater management plan (GMP) that they are required to accomplish. This project will be essential to the TPNRD in determining whether those goals and objectives have been met. The TPNRD is also required to utilize the “best available information” (Nebraska Rev. Statutes §46-709) in carrying out these duties. Without the modeling platform proposed by this project, there is no other cost-effective means to measure water use and determine if the IMP goals and objectives are being met using the best available information. The IMP is in place to ensure the long-term water sustainability of the area, making the goals and objectives of the IMP inherently beneficial.

The goals of the IMP are related to the obligations that the State of Nebraska has to the PRRIP. The PRRIP is an interstate agreement between Nebraska, Colorado, Wyoming, and the federal government. Nebraska receives benefits provided by the PRRIP related to the Endangered Species Act and three endangered species on the Platte River—the whooping crane, the least tern, and the piping plover. Without the PRRIP, the U.S. Fish and Wildlife Service may require water users in the Platte River Basin to curtail their water use activities, likely costing hundreds of millions of dollars in direct expenses and reduced economic output. In the Environmental Impact Statement for the PRRIP, the implementation of other alternatives was estimated to cost approximately \$250 million with a reduction in economic output of \$10 million per year.

#### **Prove Financial Feasibility**

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

4. Provide evidence that sufficient funds are available to complete the proposal.

**See Attachment A from the General Manager of the TPNRD documenting the District’s 2019 budget.**

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

**There are no reimbursable costs related to this project. See Attachment A from the General Manager of the TPNRD documenting the District’s 2019 budget. The TPNRD is funded by a tax levy that has been in place for many decades.**

6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal. **N/A**
7. Describe how the plan of development minimizes impacts on the natural environment (i.e. timing vs nesting/migration, etc.).

**This project will not have a negative impact on the natural environment.**

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

**The TPNRD has a wide range of statutory responsibilities and authorities, including but not limited to Nebraska Revised Statutes §2-3,201 through 2-3,243 and the Ground Water Management and Protection Act (Nebraska Rev. Statutes §46-701 through 46-756). As the state of Nebraska's preferred regulator of groundwater, the TPNRD is clearly both qualified and responsible to carry out the proposed project.**

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 is being implemented to assist the TPNRD to fulfill the requirements of their IMP. The IMP is written in accordance with the Basin-Wide Plan for the Upper Platte River Basin. Both the IMP and the Basin-Wide Plan are required by the Nebraska Ground Water Management and Protection Act (GWMPA). Nebraska is also a signatory to the interstate agreement called the PRRIP. The TPNRD also has a GMP pursuant to the GWMPA. This project will assist Nebraska and the TPNRD in meeting the requirements of all of these plans.**

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

**If yes:**

- 10.A Provide a complete listing of all lands involved in the project. **N/A**
- 10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held. **N/A**
- 10.C Provide assurance that you can hold or can acquire title to all lands not currently held. **N/A**
11. Identify how you possess all necessary authority to undertake or participate in the project.

**The TPNRD has a wide range of statutory responsibilities and authorities, including but not limited to Nebraska Revised Statutes §2-3,201 through 2-3,243 and the Ground Water Management and Protection Act (Nebraska Rev. Statutes §46-701 through 46-756). As the state of Nebraska's preferred regulator of groundwater, the TPNRD is clearly both qualified and responsible to carry out the proposed project.**

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

## Section C.

### NRC SCORING

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

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

#### **Notes:**

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

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

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

**A list of acronyms used throughout this application is included as Attachment B.**

**The approximately 44,000 people that live in the TPNRD rely on groundwater for drinking water. According to the Nebraska Department of Environment and**



Energy's 2018 Groundwater Quality Monitoring Report (see Attachment G), there are six community water supply systems with mandatory requirements triggered by high levels of nitrates within the TPNRD. In addition, there is one community public water supply system that is required to treat their drinking water due to high levels of uranium. By comparing the 2015 (see Attachment H) and 2018 Groundwater Quality Monitoring Reports, the annual maps clearly indicate that nitrate contamination has become an increasingly important concern in the TPNRD. Should future alternate drinking water supplies be needed, other groundwater sources could be evaluated with the modeling platform produced by this project. Because the TPNRD was designated as fully appropriated and overappropriated in 2004, any new use of hydrologically connected groundwater can only be developed if this use does not adversely impact existing users. This requirement means that only the most scientifically sound and up-to-date modeling tools should be used to ensure adverse impacts would not occur when evaluating other groundwater sources. The proposed modeling platform will have the ability to estimate impacts to the aquifer, streams, and existing users from any new public water supply wells.

Irrigation pumping contributes to elevated nitrate levels by promoting the leakage of fertilizers into groundwater supplies and depleting water available for drinking water. One of the goals of this project is to educate irrigators on how much water they are using and how their water use affects the aquifer and nearby streams. By delivering this information to the irrigator in an easy-to-understand way, they will feel empowered to more responsibly manage their water use, which promotes sustainability of the drinking water supply in the TPNRD. The platform will also serve as a means of identifying areas where the TPNRD could impose limitations to protect drinking water if it becomes necessary.

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 assist the TPNRD in meeting the goals and objectives of the TPNRD's IMP and GMP. The TPNRD's IMP was jointly adopted by the TPNRD and the NDNR on August 13, 2009 and updated on February 14, 2013 (see Attachment I). The first ten years (first increment) of the IMP conclude in September 2019. The draft second increment IMP has been developed and will become effective September 3, 2019 (see Attachment J). The TPNRD's GMP was adopted on December 14, 1995 (see Attachment K).

### **TPNRD IMP**

The TPNRD's IMP has the vision of "jointly managing and balancing water use and water supply while optimizing economic, social and environmental benefits for the near and long term", and the following goals:

- Protect to the extent possible existing users, local economy, environmental health, and recreational uses
- Manage total water supply in the TPNRD to achieve sustainability of supply and use while allowing for growth and changes in use
- Recognize there are multiple causes of streamflow depletion and to the extent possible distribute responsibilities appropriately

In the overappropriated area of the TPNRD, the goal of the IMP is to return the area to a fully appropriated designation and sustain it. It was determined that progress toward this designation would be benchmarked in ten (10) year increments. Within the first increment of the IMP (September 2009-August 2019), a major goal of the TPNRD was to "address impacts of streamflow depletions to surface water appropriations and water wells constructed in aquifers dependent upon recharge from streamflow to the extent those depletions are due to water use initiated after July 1, 1997." The TPNRD is required by the IMP to provide annual accretions to the river equal to or exceeding the post 1997 depletion amount.

This project will assist the TPNRD in achieving all of these goals by providing the tools required to assess their progress toward the 1997 condition. The proposed tools will have the ability to quantify their streamflow depletion offsets on an annual basis rather than the current process of measuring progress every four years. More frequent offset water estimates give the TPNRD an enhanced ability to proactively manage their water resources.

The TPNRD has expended significant resources to meet the goals and objectives of their IMP since its adoption in 2009. These efforts have included the issuance of a moratorium on new or expanded water well construction, requiring water users to certify their irrigated acres, the development of provisions for groundwater transfers, and the establishment of an accounting system for municipal, industrial, and commercial water users. In addition, the TPNRD has attended basin-wide meetings and implemented several studies and data collection efforts to monitor their progress toward meeting IMP goals. The TPNRD has also developed several projects utilizing state and local funding to assist them in meeting the IMP goals. This project will assist the TPNRD in evaluating the benefits of these projects, ensuring that the value of these investments are fully recognized.

### **TPNRD GMP**

The goals of the TPNRD's GMP are to "identify the groundwater supplies, identify changes of the groundwater levels, and identify the sources and levels of

groundwater contamination within an NRD boundary, to establish groundwater quantity and quality goals, as well as a goal for the life of the groundwater reservoir, and to develop long-term solutions necessary for the prevention and/or reduction of groundwater declines or of high levels of groundwater contaminants posing environmental and health hazards.” The GMP specifically recognizes the “lack of good scientific knowledge about groundwater systems.”

To address this lack of knowledge, the TPNRD has completed studies, collected data, and pursued groundwater modeling projects to further their understanding of the hydrologically connected surface and groundwater systems since the adoption of the GMP. This project will synthesize the information gathered from these efforts into a modeling platform that will give the TPNRD water level change estimates and impacts to baseflow. The TPNRD can also test a myriad of groundwater management actions to model their effect on the aquifer and streams, aiding them in making long-term decisions for groundwater sustainability.

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 includes the development of AgHub, a geospatial farm operation data platform that will be used by irrigators in the TPNRD to store data related to their farming practices. AgHub will be used by the TPNRD to track real-time water use estimates calculated using power records. The irrigator will have access to AgHub and information about how their water use affects the aquifer and nearby streams. By educating irrigators on their water use and impacts to the hydrologic system, it is likely that many irrigators will voluntarily reduce pumping. This benefit will help the TPNRD reduce their aquifer depletions and meet their IMP requirement to return streamflow in the Platte River to historic 1997 levels.

Water use information from AgHub will be used as input data for the watershed and groundwater models housed in the GET platform. Using GET, the TPNRD will be able to simulate management actions that increase water aquifer recharge, reduce aquifer depletion, or increase streamflow. GET will produce maps and graphs that will assist the TPNRD in assessing the spatial and temporal benefits of their management decisions. These modeling tools will help the TPNRD evaluate not only their current water use, but also how their water use might be managed in the future for the long-term sustainability of the aquifer and streams.

For example, studies have been done on the effects of conservation tillage practices on groundwater recharge in the TPNRD. Results have indicated that implementing no-till farming can increase groundwater recharge by 1-2.5 inches per acre. Using the existing GET platform, the TPNRD can simulate the effects of 1 inch per acre of additional recharge for all of the certified acres in their District (see Figures 1 and 2). The existing GET platform is already powerful enough to answer these types of questions for the TPNRD. Improvements to the platform proposed by this project would enable the TPNRD to perform any management simulation designed to promote recharge, reduce aquifer depletions, and increase streamflow within the technical framework of the Robust Review.

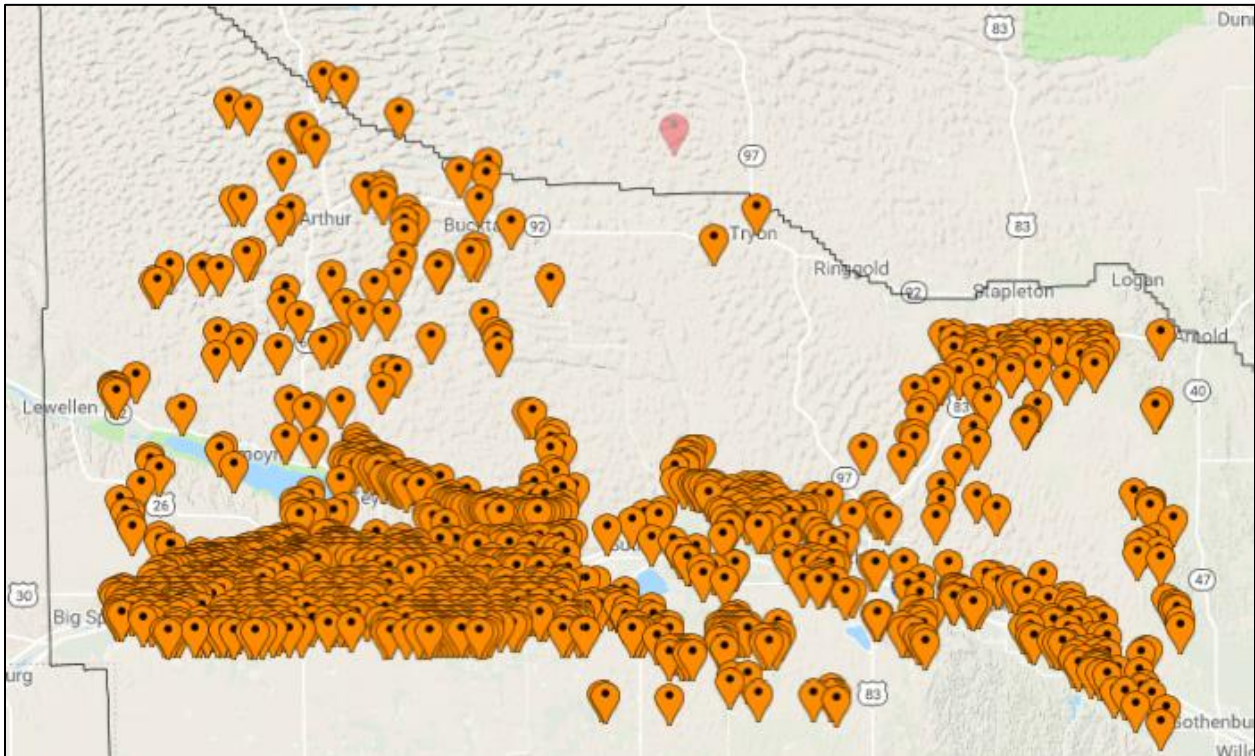


Figure 1 The interface in GET used to simulate intentional recharge. Each orange pin represents a location where 1 inch per acre of recharge is input into the groundwater model.

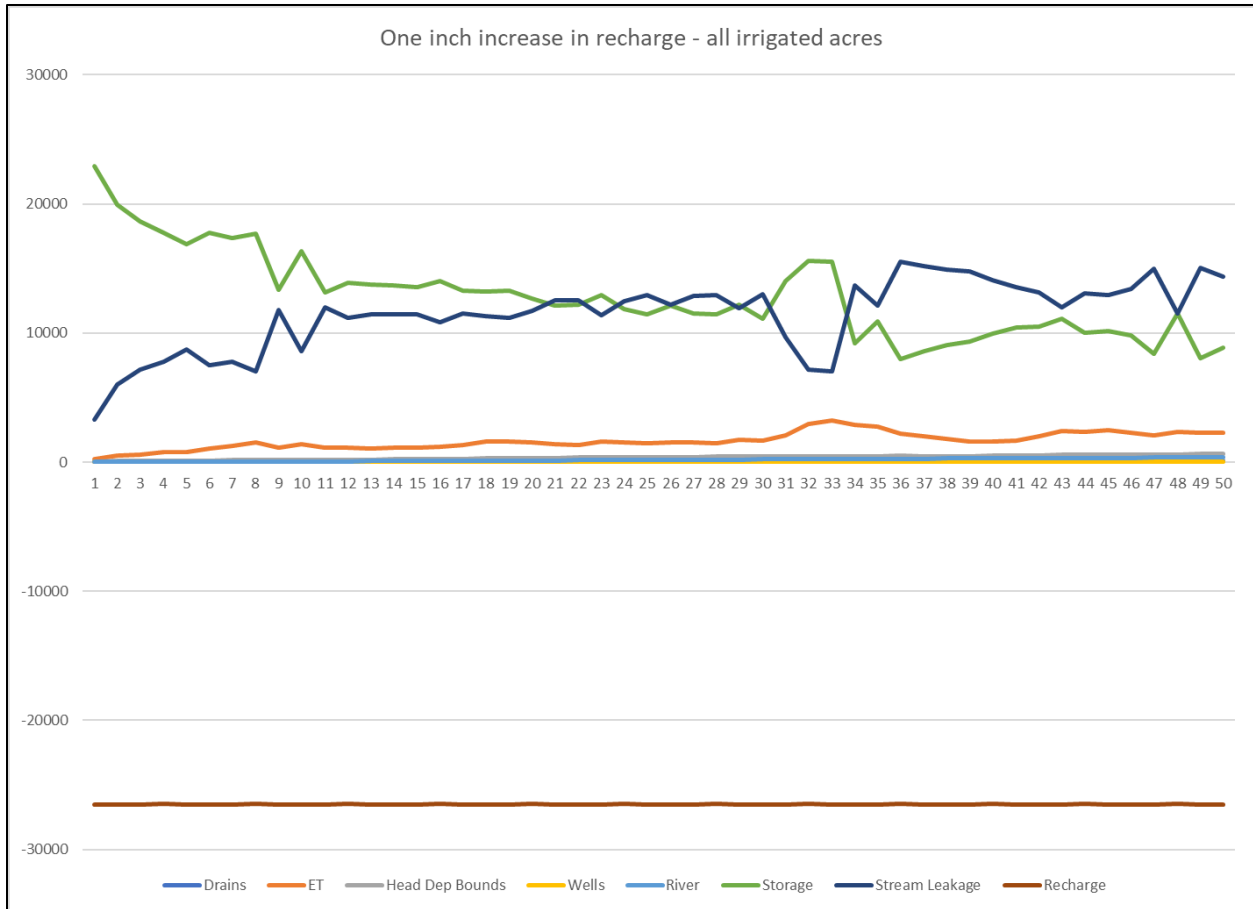


Figure 2 The groundwater model indicates one inch of recharge per certified acre would result in about 12,000 acre-feet of accretions to the stream.

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 proposed project will contribute to multiple water supply goals such as sustainable agricultural water use, the protection of municipal, industrial, domestic, and livestock uses, the conservation of water resources, and the preservation of water resources. The modeling platform developed as part of this project will supply the TPNRD with essential information that will drive decision making to support these water supply goals. This project will provide education to irrigators on their water use and how it affects the aquifer and streamflow, empowering them to conserve the future groundwater resource.**

**The TPNRD will need to use the modeling platform to predict the potential benefits of future management actions, monitor the actual benefits of past actions, and adjust their actions in an informed manner. The modeling platform represents the best science available and will be critical to the TPNRD in ensuring these water supply goals are met. Without the modeling platform, water management decision making will continue to be a reactive process rather than the proactive approach that is needed to ensure water sustainability.**

5. Maximizes the beneficial use of Nebraska's water resources for the benefit of the state's residents;
  - Describe how the project will maximize the increased beneficial use of Nebraska's water resources.
  - Describe the beneficial uses that will be reduced, if any.
  - Describe how the project provides a beneficial impact to the state's residents.

**The TPNRD is required by their IMP to return overappropriated areas in the District to a fully appropriated condition. In order to accomplish this, the TPNRD must "address impacts of streamflow depletions to surface water appropriations and water wells constructed in aquifers dependent upon recharge from streamflow to the extent those depletions are due to water use initiated after July 1, 1997." Pursuant to the IMP, the TPNRD must provide annual accretions to the river equal to or exceeding the post-1997 depletion amount.**

**To meet this requirement, it is necessary for the TPNRD to be as informed as possible on the water use in their District and its implications on future aquifer levels and streamflow. This project will educate the irrigator on how their groundwater use affects the hydrologic system, encouraging them to optimize their operations. Both the TPNRD and the irrigator will be working together to strike the appropriate balance between maximum beneficial consumptive use and limiting adverse impacts to the aquifer and streamflow. The proposed project will accomplish this goal by providing the information necessary to quantify this balance. Promoting the sustainability of the local economy will provide a benefit to all of the state's residents.**

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 cost of the project is \$3,415,000. The next best alternative would be to create a flow meter program at the TPNRD to measure water use. The TPNRD would have to hire a consultant to incorporate the water use data into a model and conduct annual model runs, including the Robust Review in 2023, 2027, and 2029. The Robust Review is a highly technical evaluation that is required by the TPNRD's IMP at regular intervals. Several NRDs have metering programs in place and cost-share with the landowner on meter installation, maintenance, and repair. If the TPNRD were to institute a similar program, estimated resource and staff costs would amount to over \$12,900,000 over a ten-year period. This cost is significantly higher than the proposed project cost and does not include modeling, which could involve perpetual costs of at least \$250,000 per year.

This project is proposing to use daily precipitation and evapotranspiration data to complete a water-balance on each parcel in the TPNRD and relay this information to the irrigator via an easy-to-understand dashboard. Another benefit this project offers is the ability to efficiently re-evaluate the IMP goals and the TPNRD's requirement in offset water. There is no other technically or financially comparable way of achieving the same benefits. The modeling platform will empower the TPNRD to make proactive water management decisions by understanding how an action can affect the aquifer and streams before they take it. Hiring a consultant to conduct model runs and produce a report once per year does not give the TPNRD the same flexibility.

The goals of the TPNRD's IMP are also related to obligations that Nebraska has to the PRRIP, an interstate agreement between Nebraska, Colorado, and Wyoming. The modeling platform proposed as part of this project will help Nebraska demonstrate that it has met its obligations. The PRRIP provides benefits to Nebraska related to the Endangered Species Act; specifically, to three endangered species on the Central Platte River, the whooping crane, the least tern, and the piping plover. The PRRIP meets conditions the U.S. Fish and Wildlife Service could require for water users along the Platte River. The Environmental Impact Statement for the PRRIP indicated that without the PRRIP, other alternatives could cost \$250 million and economic output could be reduced by over \$10 million annual in the Platte River Basin.

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 proposed project will assist the State of Nebraska in meeting its obligations under the PRRIP, an interstate agreement between Nebraska, Colorado, and Wyoming. The TPNRD lies upstream of the critical habitat areas of the Platte River. Impacts to flows must be quantified and limited within or above the critical habitat reach. Both the Nebraska New Depletions Plan (NNDP) (see Attachment L), a component of the Water Plan for the PRRIP, and the TPNRD's IMP require the TPNRD to offset any new depletions to Platte River streamflow that have occurred since July 1, 1997.**

**This project will enable the TPNRD to efficiently track their depletions and offset requirements using advanced modeling techniques. The TPNRD has also undertaken various management actions pursuant to their IMP to comply with the NNDP. The only way to document whether these actions have been successful is with a groundwater model. The proposed modeling platform will enhance the TPNRD's ability to measure this success, but also simulate the effects of management actions before they take them. This level of proactive management would not be possible without this project.**

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 supply in the TPNRD is critically important to the State of Nebraska and to the United States. Without this supply, effects to public security, public health, and safety would be debilitating. The TPNRD water use estimation and modeling project is absolutely essential in promoting the sustainability of the groundwater supply in the Upper Platte River Basin. Enhancing the TPNRD's**



ability to make informed decisions shifts the reactive management of the past to a proactive approach for the future.

This proactive approach will be especially critical as projected declines in groundwater supplies contribute to uncertainties in future food security. A report released by the United States Department of Homeland Security's Office of Cyber and Infrastructure Analysis titled Analysis of High Plains Resource Risk and Economic Impacts (see Attachment M) outlines the importance of the High Plains Aquifer to the country. The report analyzed how continued depletions of the High Plains aquifer in Kansas and Nebraska might impact critical infrastructure and the economy at local, regional, and national levels. According to the report, groundwater supplies in some areas of the TPNRD are projected to face exhaustion in 100-200 years. How the TPNRD manages their supply in the present will dictate whether groundwater is available in the future. The proposed project is clearly beneficial to public security, public health, and safety by supplying the TPNRD with information on the current state of groundwater availability in the District and how that might change over time.

9. Improves water quality;

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

Groundwater supplies in some areas of the TPNRD have experienced high levels of nitrates. According to the Quality-Assessed Agrichemical Contaminant Database for Nebraska Ground Water maintained by the Nebraska Department of Environment and Energy, 7 of the 9 monitoring wells sampled in the TPNRD in 2017 exhibited nitrate levels well above the drinking water Maximum Contaminant Limit of 10 milligrams per liter. Irrigation pumping contributes to elevated nitrate levels by promoting the leakage of fertilizers into groundwater supplies by leaching nutrients in the soil downward into the aquifer. One of the goals of this project is to educate irrigators on how much water they are using and how their water use affects the aquifer and nearby streams. This project will also enhance the TPNRD's ability to spatially define field application rates through water use calculations. The TPNRD can work with irrigators that overirrigate to lessen their water application. Reducing overirrigation improves groundwater quality by reducing nitrate leakage.

The TPNRD has worked to address this issue of high nitrates by regularly collecting water samples to monitor nitrate levels. The TPNRD also provides worksheets and forms to help irrigators calculate the total nitrogen needed for

**their predicted yield. Irrigators can use these forms and water samples to take advantage of any residual nitrogen from the previous year and avoid nitrogen overapplication.**

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 this project is the TPNRD. The TPNRD has the ability to support the proposed project as evidenced by the budget provided for fiscal year 2019 (see Attachment A). To demonstrate the TPNRD's commitment to the project, the TPNRD has already entered into contracts with software developers and well drilling companies to begin estimating water use. The TPNRD has pledged to cover 100% of costs up to \$650,000 in the initial stages of the project before WSF grant money can be applied.**

**The TPNRD also has the option to support this project through their tax levy authority. The current tax levy for the TPNRD is 2.3308¢ per \$100 valuation. The TPNRD has developed several projects utilizing state and local funding to assist them in meeting the IMP goals. This project will assist the TPNRD in evaluating the benefits of these projects, ensuring that the value of these investments are fully recognized.**

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, the TPNRD, has multiple plans in place that support sustainable water use, including an IMP and a GMP. The TPNRD's IMP was jointly adopted by the TPNRD and the NDNR on August 13, 2009 and updated on February 14, 2013 (see Attachment I). The first ten years (first increment) of the IMP conclude in September 2019. The draft second increment IMP has been**

developed and will become effective September 3, 2019 (see Attachment J). The TPNRD's GMP was adopted on December 14, 1995 (see Attachment K).

### **TPNRD IMP**

The TPNRD's IMP has the vision of “jointly managing and balancing water use and water supply while optimizing economic, social and environmental benefits for the near and long term”, and the following goals:

- **Protect to the extent possible existing users, local economy, environmental health, and recreational uses**
- **Manage total water supply in the TPNRD to achieve sustainability of supply and use while allowing for growth and changes in use**
- **Recognize there are multiple causes of streamflow depletion and to the extent possible distribute responsibilities appropriately**

In the overappropriated area of the TPNRD, the goal of the IMP is to return the area to a fully appropriated condition and sustain it. It was determined that progress toward this designation would be benchmarked in ten (10) year increments. Within the first increment of the IMP (September 2009-August 2019), a major goal of the TPNRD was to “address impacts of streamflow depletions to surface water appropriations and water wells constructed in aquifers dependent upon recharge from streamflow to the extent those depletions are due to water use initiated after July 1, 1997.” The TPNRD is required by the IMP to provide annual accretions to the river equal to or exceeding the post-1997 depletion amount.

This project will assist the TPNRD in achieving all of these goals by providing the tools required to assess their progress toward the 1997 condition. The proposed tools will have the ability to quantify their streamflow depletion offsets on an annual basis rather than the current process of measuring progress every four years. More frequent offset water estimates give the TPNRD an enhanced ability to proactively manage their water resources.

The TPNRD has expended significant resources to meet the goals and objectives of their IMP since its adoption in 2009. These efforts have included the issuance of a moratorium on new or expanded water well construction, requiring water users to certify their irrigated acres, the development of provisions for groundwater transfers, and the establishment of an accounting system for municipal, industrial, and commercial water users. In addition, the TPNRD has attended basin-wide meetings and implemented several studies and data collection efforts to monitor their progress toward meeting IMP goals. The TPNRD has also developed several projects utilizing state and local funding to assist them in meeting the IMP goals. This project will assist the TPNRD in evaluating the benefits of these projects, ensuring that the value of these investments are fully recognized.

## **TPNRD GMP**

The goals of the TPNRD's GMP are to "identify the groundwater supplies, identify changes of the groundwater levels, and identify the sources and levels of groundwater contamination within an NRD boundary, to establish groundwater quantity and quality goals, as well as a goal for the life of the groundwater reservoir, and to develop long-term solutions necessary for the prevention and/or reduction of groundwater declines or of high levels of groundwater contaminants posing environmental and health hazards." The GMP specifically recognizes the "lack of good scientific knowledge about groundwater systems."

To address this lack of knowledge, the TPNRD has completed studies, collected data, and pursued groundwater modeling projects to further their understanding of the hydrologically connected surface and groundwater systems since the adoption of the GMP. This project will synthesize the information gathered from these efforts into a modeling platform that will give the TPNRD water level change estimates and impacts to baseflow. The TPNRD can also test a myriad of groundwater management actions to model their effect on the aquifer and streams, aiding them in making long-term decisions for groundwater sustainability.

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 helps the state meet its obligations under the PRRIP, which is clearly a statewide issue. This interstate agreement was signed by the Governor. The Legislature has provided a significant amount of general fund appropriations through the DNR to implement the PRRIP. This project is essential to Nebraska's ability to meet its obligations under the PRRIP.

Nebraska's obligations are contained within the NNDP, a component of the Water Plan for the PRRIP. Generally speaking, the NNDP requires Nebraska to offset any depletions to Platte River streamflow that result from new or expanded uses that have occurred subsequent to July 1, 1997. Successful implementation of the PRRIP and the NNDP provides benefits to the approximately 500,000 irrigated acres in the Platte River Basin that were developed subsequent to 1997. By successfully offsetting the impact of these irrigated acres, Nebraska's economy will benefit significantly by allowing those acres to remain in irrigated agriculture.

The TPNRD has undertaken various management actions pursuant to their IMP in order to provide compliance with the NNDP. However, the only way to document

whether these actions have, in fact, been successful requires a groundwater model. In addition to providing the TPNRD with groundwater modeling capabilities, the proposed platform will incorporate actual water use calculations. Irrigators in the TPNRD will be given information on how their water use affects the aquifer and streamflow, helping them optimize their irrigation practices for water sustainability. This will provide direct benefits to the 320,000 groundwater irrigated acres in the TPNRD, as well as to residents across the state by ensuring adequate groundwater and surface water supplies will be available into the future.

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 will pay 40% of the project cost in this WSF application. Significant additional investments have been made by the TPNRD to initiate this project as quickly as possible. The TPNRD has entered into contracts to contribute \$656,900 towards data collection efforts that have already begun and will continue to occur until WSF grant money can be applied. These initial efforts and the TPNRD's budget from fiscal year 2019 demonstrates their commitment to the project (see Attachment A).**

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.

**This project will contribute to watershed health and function in the South Platte River, North Platte River, Birdwood Creek, and Platte River watersheds. Benefits to water quality and quantity will be realized across the entire TPNRD. This project will provide the TPNRD the information they require to make appropriate management decisions regarding water consumption and potential actions they could take to reduce aquifer depletions and increase streamflow.**

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 following excerpt is taken from the Annual Report and Plan of Work published by the Department of Natural Resources (Department) in September 2018:

*“The Department plans to use the WWUM and COHSYT models and pertinent datasets for future IMP analyses, which will include implementing additional management actions and scenarios to improve understanding of conjunctive management of groundwater and surface water. The robust review of management actions at the river basin scale will also be conducted using these models.”*

This project will use the COHYST model to evaluate the progress of the TPNRD’s water use and management activities toward their IMP goals. The newest and most scientifically advanced data will be incorporated into the model, which will assist the Department in their objective of an improved understanding of groundwater and surface water supplies in the Upper Platte River Basin.

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.

This project will aid in meeting the requirements of a federal mandate called the PRRIP. PRRIP is the means by which the states of Colorado, Wyoming, and Nebraska are providing regulatory certainty with regard to the U.S. Endangered Species Act. The federally listed least tern, piping plover, and whooping crane must be addressed under the Endangered Species Act. If the PRRIP did not exist, other water management actions would be required of the states or individual water users on the Platte River. The TPNRD modeling platform is essential to Nebraska’s ability to meet its obligations under the PRRIP. Nebraska’s obligations are contained within the NNDP, a component of the Water Plan for the PRRIP. Generally speaking, the NNDP requires Nebraska to offset any depletions to Platte River streamflow that result from new or expanded uses that have occurred subsequent to July 1, 1997. The TPNRD has undertaken various

**management actions pursuant to their IMP in order to provide compliance with the NNDP. However, the only way to document whether these actions have been successful requires the use of the groundwater model included in the proposed modeling platform. Without this project, it will be difficult to properly document Nebraska's compliance with the NNDP for water uses within the TPNRD.**