NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Lower Platte River Basin Sub-Regional Groundwater Modeling

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

Sponsor Business Name: Papio-Missouri River Natural Resources District (PMRNRD)

Sponsor Contact's Name: John Winkler, General Manager

Sponsor Contact's Address: 8901 S 154th Street, Omaha, NE 68138

Sponsor Contact's Phone: 402-444-6222

Sponsor Contact's Email: jwinkler@papionrd.org

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

   Grant amount requested. $ 250,000.00

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

   If a loan is requested amount requested. $ NA

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

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. Click here to enter text.

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

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

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

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

None

4. **Partnerships**

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

Papio-Missouri River Natural Resources District (PMRNRD)
The PMRNRD is a co-sponsor and the lead agency. Their role will be to serve as the fiscal agent to NeDNR and NRC, communicate and guide the project along with LPNNRD, LPSNRD, NeDNR, and manage the contractor responsible for the groundwater modeling. The PMRNRD will provide financial support in accordance with their attached letter of support. They will enter an interlocal agreement once the grant is approved with each co-sponsor, provide data, technical support, and review all work products.

Lower Platte North Natural Resources District (LPNNRD)
The LPNNRD is a project co-sponsor and will provide funding in accordance with their attached letter of support. Their role will be to provide data, technical support, and review all work products.

Lower Platte South Natural Resources District (LPSNRD)
The LPSNRD is a project co-sponsor and will provide funding in accordance with their attached letter of support. Their role will be to provide data, technical support, and review all work products.

Nebraska Department of Natural Resources (NDNR)
The NDNR is consulting with LPNNRD, LPSNRD and PMRNRD and will provide funding, should the WSF application be successful. NDNR staff will be responsible for reviewing deliverables and providing technical support.

5. **Other Sources of Funding**

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

The total cost of the entire project is estimated to be $660,000. All sources of funding will be applied to contracted professional services responsible for creating, running, and documenting new sub-regional groundwater models for the area covered by the LPNNRD, LPSNRD and P-MRNRD. All sources of funding have been confirmed over an anticipated three-year project schedule and are documented in attached letters of support. The projected cost-share for this WSF Grant Application is shown below:

Table 1 – Total Cost and Cost-Share Breakdown

Entity	Yearly Contribution	Total Contribution
Papio	$23,697.22	$71,091.67
LPS	$23,697.22	$71,091.67
LPN	$23,697.22	$71,091.67
NeDNR	$65,575.00	$196,725.00
WSF		$250,000.00
Project Total		$660,000.00

Entity	Total Contribution	Percentage
NRDs	$213,275.01	32.3%
NeDNR	$196,725.00	29.8%
WSF	$250,000.00	37.9%

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!

Water Sustainability Funds are requested to support the development of a sub-regional groundwater flow model or models (depending on decisions and needs during development) for the combined areas of the LPSNRD, LPNNRD, and PMRNRD.

The purpose of this new sub-regional groundwater model is multifaceted and will have multiple uses to benefit both the cooperating NRDs and the State of Nebraska (State). The finalized model will give the NRDs a tool that utilizes collected data to aid in decision making in areas such as groundwater development within a District, analysis or impacts of future and historic decisions, examine wellhead protections, or how climatic change may impact an aquifer sub-regionally. The State would have a new model that can be used to enhance and improve the existing regional Lower Platte Missouri Tributaries Model (LPMT) developed by NeDNR in 2018 and will gain a new tool to determine depletion impacts of streams within the region.

The existing LPMT model developed is not based on the Airborne Electromagnetic (AEM) data that has been collected to comprehensively reflect the subsurface geology in Eastern Nebraska. This new sub-regional model will incorporate AEM data into the initial modeled hydrogeologic properties, have a finer grid size allowing for more detailed data to be utilized, will have historic information up to 2021 incorporated, and will be developed in the updated MODFLOW 6 framework. The new MODFLOW 6 framework will allow the new sub-regional model and the newly completed Lower Elkhorn District Model to be incorporated into an updated LPMT as a nested parent-child model, which will allow all three models to “talk” to each other. This will decrease computational errors that currently occur along model boundaries and give greater confidence in modeled results in those regions.

This project will incorporate the AEM hydrogeologic framework already developed by the PMRNRD and LPNNRD as part of WSF Grant 5303 and by the LPSNRD as part of WSF Grant 5311. Interpolation of the AEM data resulted in multiple layers of 3D geologic cells that can be directly imported into new USGS MODFLOW 6 models.

The processed AEM hydrogeologic data will be integrated with the most recent surface water modeling data, including new historic precipitation and land use data, and calibrated to the best available hydrologic datasets, including streamflow and groundwater level data. As a result of this project, the calibrated groundwater model will be used by NeDNR to evaluate areas within each NRD that are considered hydrologically connected (HCA) between surface and groundwater.

Upon completion of the HCA scenario analysis, the final model review, and documentation of the sub-regional model, NeDNR will have full access to the new model and will have the ability to incorporate it into the LPMT model. It is intended that this new model, the Lower Elkhorn District model, and the LPT model be utilized for stream depletion analysis prior to the end of the Lower Platte River Basin Plan second increment in 2026. The schedule for this project is based on meeting this milestone, see below.

2nd Qtr. - 2023	3rd Qtr. - 2023	4th Qtr. - 2023	1st Qtr. - 2024	2nd Qtr. - 2024	3rd Qtr. - 2024	4th Qtr. - 2024	1st Qtr. - 2025	2nd Qtr. - 2025	3rd Qtr. - 2025
Consultant Selection and Data Compilation	Model Development				1st round Calibration and Analysis			2nd round Calibration and Analysis	Scenario Runs and Documentation

Long-term benefits from this project include the development of a baseline sub-regional groundwater model that will help establish groundwater and surface water management criteria for NeDNR, the Lower Platte River Basin-wide Plan and each NRD's Integrated Management Plan (IMP). Another potential collaboration from this project would be the ability to comprehensively model the Lower Platte River and Todd Valley aquifers as part of any future assessments conducted between Lincoln Water Systems (LWS) and the Metropolitan Utilities District (MUD). As such, LWS and MUD have both provided enclosed letters of support for this project.

Because the groundwater model will be developed in the latest MODFLOW 6 software, future uses of the modeling for groundwater management discussion and decisions is relatively easy. Future uses may include well interference analysis, individual well depletion modeling, water quality contamination and transport, and wellhead protection particle tracking.

Figure 1 below shows the three NRD project area and Table 2 documents each NRDs size and population.

Table 2 –Population Potentially Benefited

JURISDICTION	Total Population*	No. of Communities	NRD Size (AC)
LPNNRD	65,000	30	1,030,000
PMRNRD	813,000	34	1,145,700
LPSNRD	350,000	33	1,068,000
TOTALS	**1,228,000**	**97**	**3,243,700**

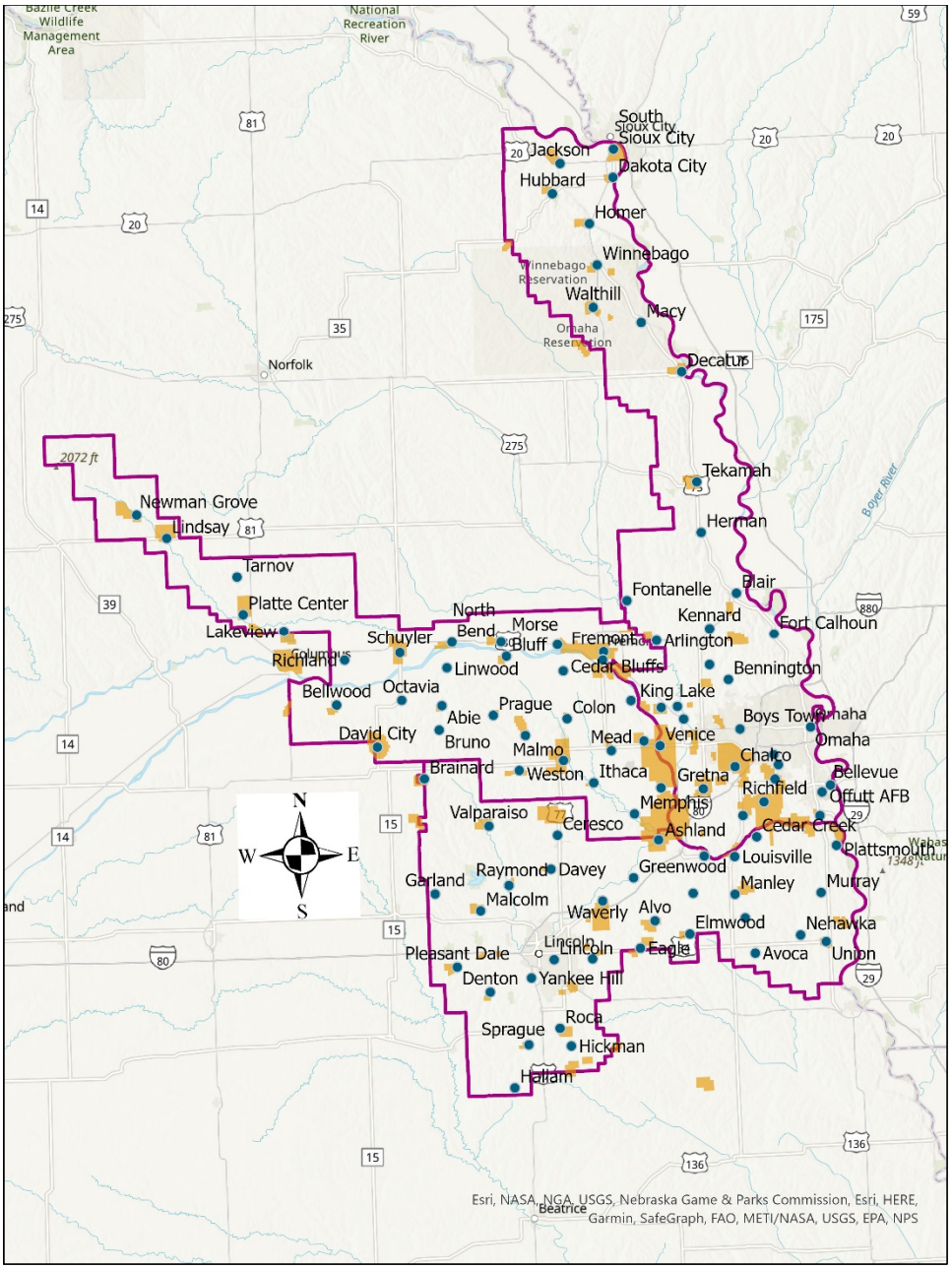

Figure 1. LPSNRD, LPNNRD and PMRNRD project area showing communities and Wellhead Protection Areas (in orange)

7. **Project Tasks and Timeline**

Identify what activities will be conducted to complete the project, and the anticipated completion date.
For multiyear projects please list (using the following example):

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

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

The estimated cost by task and schedule are provided in Table 3. The project is anticipated to begin December 2023 and be complete by August 2025. The WSF funding will be applied to all aspects of the project.

Table 3 – Cost by Task and Year

TASK	TITLE	COST (2023)	COST (2024)	COST (2025)
1	PM/Meetings	$20,000	$20,000	$20,000
2	Develop Model(s)	$270,000	$0	$0
3	Calibrate Model(s)	$0	$140,000	$0
4	Model Analysis	$0	$140,000	$0
5	Review and Reporting	$0	$0	$50,000
	ANNUAL TOTAL	**$290,000**	**$300,000**	**$70,000**

8. **IMP**

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

All three NRDs have an approved Integrated Management Plan.

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; Click here to enter text.

1.A.2 Describe the plan of development (004.01 A); Click here to enter text.

1.A.3 Include a description of all field investigations made to substantiate the feasibility report (004.01 B); Click here to enter text.

1.A.4 Provide maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); Click here to enter text.

1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D); Click here to enter text.

1.A.6 Discuss each component of the final plan (004.01 E); Click here to enter text.

1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); Click here to enter text.

1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2); Click here to enter text.

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). Click here to enter text.

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

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

This project will utilize AEM data collected by each NRD and apply the same proven approach and techniques that were recently used to complete the sub-regional groundwater flow modeling supported by the Lower Elkhorn NRD (LENRD) and NeDNR. The AEM surveys have provided excellent characterization of the hydrostratigraphy across the NRDs based on the electrical properties of earth materials from the land surface

downward using electromagnetic induction. AEM data was used by LENRD to construct a MODFLOW 6 model for their District, which lies adjacent to both the Papio-Missouri River NRD (PMRNRD) and Lower Platte North NRD (LPNNRD).

This same approach and workflow will be applied to the Lower Platte River Basin Sub-Regional Groundwater Model to capture the benefits of enhanced geologic data and extended historic surface water modeling data. MODFLOW 6 is designed to allow multiple models to be combined or merged into a larger cohesive regional model. This is the plan for revising NeDNR's existing Lower Platte Missouri Tributaries (LPMT) model by integrating the updated models of LENRD and the model produced by this project for the PMRNRD, LPSNRD, and LPNNRD.

The AEM resistivity data has been correlated to ranges of hydraulic conductivity of the aquifer and non-aquifer materials. Based on these correlations, the AEM data has been used to construct 3D numerical groundwater flow model grids with a range of hydraulic conductivity values.

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

NeDNR, the PMRNRD, LPSNRD and LPNNRD are collaborating on this project to ensure that the groundwater flow model created is consistent with the LENRD model, which will enable the Lower Platte River Basin NRDs to work in sync on water modeling analysis and management.

Once the processed AEM hydrogeologic data can be integrated with the most recent surface water modeling data, including new precipitation and land use data, then new groundwater models can be run and calibrated to the best available hydrologic datasets, including streamflow and groundwater level data. As part of this project, the calibrated groundwater model will be used by NeDNR to evaluate areas within each NRD that are considered hydrologically connected (HCA) between surface and groundwater.

Upon completion of the HCA scenario analysis, the final model review, and documentation of the sub-regional model, NeDNR will have full access to the new model and will have the ability to incorporate it into the LPMT model. It is intended that this new model, the Lower Elkhorn District model, and the LPT model be utilized for stream depletion analysis prior to the end of the Lower Platte River Basin Plan second increment in 2026. The schedule for this project is based on meeting this milestone, see below.

2nd Qtr. - 2023	3rd Qtr. - 2023	4th Qtr. - 2023	1st Qtr. - 2024	2nd Qtr. - 2024	3rd Qtr. - 2024	4th Qtr. - 2024	1st Qtr. - 2025	2nd Qtr. - 2025	3rd Qtr. - 2025
Consultant Selection and Data Compilation	Model Development				1st round Calibration and Analysis			2nd round Calibration and Analysis	Scenario Runs and Documentation

1.B.3 Describe field or research investigations utilized to substantiate the project conception (004.02 B); This project does not include new field or research investigations, only analysis of existing information

1.B.4 Describe any necessary water and/or land rights (004.02 C); No water and/or land rights are required for this project

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 will be no effects on the operation of existing structural measures.

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 methodology being used to incorporate geophysical data (i.e. AEM) into a sub-regional groundwater model, is based upon the successful work completed by the LENRD and NeDNR during development of a sub-regional MODFLOW 6 model which provided LENRD and NDNR with a proven methodology on how to best use AEM data in both a 3D Hydrogeologic Framework and groundwater flow model (MODFLOW).

The LENRD sub-regional model has shown that the AEM surveys provide excellent characterization of the hydrostraigraphy across the NRDs based on the electrical properties of earth materials from the land surface downward using electromagnetic induction. This same approach and modeling workflow will be applied when building sub-regional groundwater flow models for the areas of the LPNNRD, LPSNRD, and PMRNRD.

By completing the sub-regional model together, there is considerable cost savings (~$200,000), versus all three NRDs developing models individually. Modeling groundwater flow with MODFLOW is one of the most tested and applied processes for accurately determining hydrologically connected areas and estimating stream flow depletions. Using the AEM hydrogeologic data, latest historical surface water data, and the latest modeling techniques will provide the most economical process for creating a sub-regional baseline groundwater flow model. Once all the sub-regional models are developed, they can be combined as an update to the regional Lower Platte Missouri Tributaries Model.

3. Document all sources and report all **costs** and **benefit data** using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies is the project life. (Title 261, CH 2 - 005).

The total cost estimate for this project is $660,000 and was provided by JEO Consulting Group, Inc., Long Spring Consulting, and LRE Water Inc. who were responsible for the development of the sub-regional groundwater model for the LENRD. This estimated project cost was correlated from the LENRD project effort and then based upon the size and complexity of the three NRD area and the development of up to two separate sub-regional models.

One of this project's benefits is building off past projects within Eastern Nebraska, including AEM data collection and the hydrogeologic framework development. AEM data collection across the LPSNRD, LPNNRD, and PMRNRD dates back to 2014 and cost approximately $6 million, see Figure 2 map of AEM data collection. It is estimated that 50% of this cost came from WSF Grant Funding, while 50% was provided through local NRD general funds. The new groundwater modeling resulting from this project will also incorporate the AEM hydrogeologic framework data already developed by the PMRNRD and LPNNRD as part of WSF Grant 5303 and by the LPSNRD as part of WSF Grant 5311. The total cost of these grant projects is anticipated to be $300,000 and $412,500 respectively, with approx. 60% provided by WSF grants and 40% from local NRD budgets.

A detailed benefit cost analysis is not practical for this type of project, but it appears evident that the long-term water management benefits will exceed the combined cost of the AEM data collection, framework development cost, and modeling costs. The essential purpose of this project is to develop and utilize a groundwater model that reflects real-world conditions most accurately. By doing this, the extent of the area included in the HCA and the analysis of stream depletion will best reflect estimated human water use and its effects on the environment. Therefore, this effort is dedicated to protecting the economic value of current water uses and allowing the expansion of future water uses to the extent practical, continuing to grow the economy of Eastern Nebraska. By completing the sub-regional model together, there is considerable cost savings (~$200,000), versus all three NRDs developing models individually.

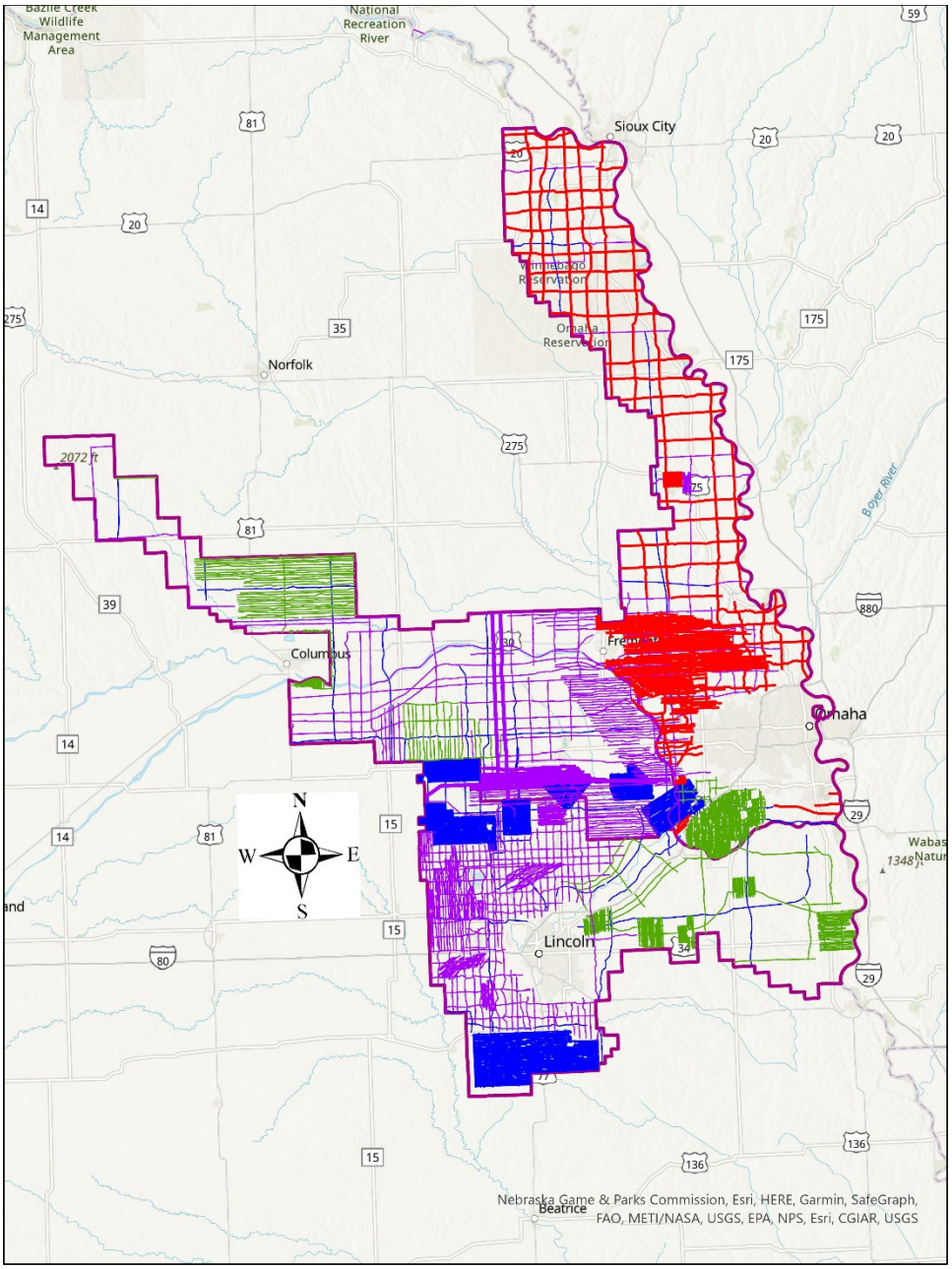

Figure 2. AEM data previously collected in the LPSNRD, LPNNRD and PMRNRD Project Area.

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

All costs for this project will be applied to contracted professional services responsible for creating, running, and documenting a new sub-regional groundwater model for the area covered by the LPNNRD, LPSNRD and P-MRNRD. There are no costs for capital construction costs, annual O&M or replacement costs. Below is a breakdown of the project costs by task and schedule:

Table 4 – Cost by Task and Year

TASK	TITLE	COST (2023)	COST (2024)	COST (2025)
1	PM/Meetings	$20,000	$20,000	$20,000
2	Develop Model(s)	$270,000	$0	$0
3	Calibrate Model(s)	$0	$140,000	$0
4	Model Analysis	$0	$140,000	$0
5	Review and Reporting	$0	$0	$50,000
	ANNUAL TOTAL	**$290,000**	**$300,000**	**$70,000**

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 development of an accurate sub-regional groundwater model will provide each NRD with a solid scientific background for assessing stream depletions and help inform water management decisions. The project could also assist each NRD on making decisions that wisely allow the development of future water uses, thus safeguarding the current use of groundwater for irrigation and supporting the agricultural economy of Nebraska. Lastly, this project takes full advantage of the past funding and work invested into AEM data, test holes, monitoring wells, and groundwater levels by the three NRDs, NeDNR, and NRC.

The LPNNRD, LPSNRD and PMRNRD are confident that improved data and technology will promote and increase water sustainability efforts throughout the region and within the Lower Platte River Basin.

3.C Present all cost and benefit data in a table to indicate the annual cash flow for the life of the project (005.03).

The total project cost is $660,000 (see Table 5) over a three-year period, split by NeDNR, PMRNRD, LPNNRD, LPSNRD and the proposed WSF grant. The overall benefit is sound

water management in the Lower Platte Basin utilizing the NRD, NeDNR, and previous WSF grant investments in AEM and hydrogeologic framework data. Some of the many specific benefits include:

1) Better understanding of the connection and flow of groundwater systems
2) Evaluating existing wells and assessing new well permit applications
3) Completing aquifer vulnerability assessment for protection of groundwater resources and identifying areas for implementing best management practices
4) Identifying potential areas for groundwater recharge and water quality contamination
5) Evaluating the hydrologic connection between surface water and groundwater

Table 5 – Total Cost and Cost-Share Breakdown

Entity	Yearly Contribution	Total Contribution
Papio	$23,697.22	$71,091.67
LPS	$23,697.22	$71,091.67
LPN	$23,697.22	$71,091.67
NeDNR	$65,575.00	$196,725.00
WSF		$250,000.00
Project Total		$660,000.00

Entity	Total Contribution	Percentage
NRDs	$213,275.01	32.3%
NeDNR	$196,725.00	29.8%
WSF	$250,000.00	37.9%

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.)

See 3. C above for the cost. There is no alternative method for evaluating long-term water use and its impacts other than developing and running a numeric groundwater model that is based on the most accurate real-world data and calibrated with real-world historic hydrologic measurements. This has been the accepted and utilized method by NeDNR across Nebraska over the past several decades, federal agencies such as the USGS, and water agencies in other states across the country.

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.

   Letters of support and financial assistance are found in Attachment A. Each contributing organization has confirmed that funding is available in their current budgets and each NRD Board has approved full participation in the project.

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

   Nebraska Department of Natural Resources
   The NeDNR is contributing $196,725 or ~29.8% of the project total and has committed this funding over the next three years (2023 – 2025)

   Papio-Missouri River Natural Resources District (PMRNRD)
   The PMRNRD is contributing $71,091.67, or ~10.8% of the project total. The PMRNRD has estimated the 2022-2023 property tax request at 0.035669 cents per $100 of valuation resulting in $30,185,961 from property taxes, and a total operating budget of $105,787,464.

   Lower Platte South Natural Resources District (LPNNRD)
   The LPNNRD is contributing $71,091.67, or ~10.8% of the project total. The LPSNRD's proposed FY 22 – 23 operating budget is $36,684,328 with $10,156,870 of that required from the local tax levy.

   Lower Platte North Natural Resources District (LPNNRD)
   The LPNNRD is contributing $71,091.67, or ~10.8% of the project total. The LPNNRD's FY 21-22 operating budget was $8,217,366 with $4,141,372 of that required from LPNNRD local tax levy. The 2022-2023 budget is anticipated to be similar.

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 (i.e. timing vs nesting/migration, etc.). No environmental impact will occur as a result of this project.

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

   NRDs are responsible for protecting and maintaining groundwater quality and quantity for municipal, domestic, and agricultural uses (Nebraska State Statute Chapter 2 Article 32 and Nebraska Groundwater Protection Act Chapter 46 Article 7). The PMRNRD has set policies and procedures for selecting and retaining professional services and has the authority to enter into Interlocal Cooperation Agreements with other governmental agencies.

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 supports implementation of actions to achieve goals of the Lower Platte River Basin Coalition's Basin Water Management Plan for all three NRDs and NeDNR. Additionally, each NRD has a voluntary integrated water management plan (IMP) with NeDNR, whose primary goal is the management of hydrologically connected portions of each NRD to achieve and sustain a balance between water uses and water supplied for the long-term.

- LPNNRD's IMP was effective in July 2018
- PMRNRD IMP was effective in August 2014
- LPSNRD's IMP was effective in May 2014

This project is directly related to implementation and support of plans and programs of the state resource development 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. Click here to enter text.

10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held. Click here to enter text.

10.C 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.

NRDs are responsible for protecting and maintaining groundwater quality and quantity for municipal, domestic, and agricultural uses (Nebraska State Statute Chapter 2 Article 32 and Nebraska Groundwater Protection Act Chapter 46 Article 7). The PMRNRD has set policies and procedures for selecting and retaining professional services and has the authority to enter into Interlocal Cooperation Agreements with other governmental agencies.

12. Identify the probable consequences (environmental and ecological) that may result if the project is or is not completed. No environmental or ecological impact will occur as a result of this project.

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.

   The proposed Lower Platte River Basin Sub-Regional Groundwater Modeling project will be essential in future efforts to sustain drinking water quantity and quality. Creating a baseline sub-regional groundwater model based on the most accurate hydrogeologic and hydrologic data available will provide insight and tools for addressing future drinking water challenges in the Lower Platte River subbasin.

   One possible threat to drinking water is a reliable water supply during drought conditions. The Lower Platte River Drought Contingency Plan highlights the potential impacts of severe long-term or flash drought in the Lower Platte River. One of the primary vulnerabilities is to public water supplies along the Lower Platte River who do

not have a redundant or secondary water source. Municipalities who lack this secondary water source rely solely on the flows in the Platte River to sustain groundwater levels in the highly connected alluvial aquifers along the river. These public water suppliers who rely solely on the Platte River alluvial aquifer include Papillion, Louisville, South Bend, Lincoln, Valley, Fremont, North Bend, Schuyler, and Columbus, serving a population of nearly 373,000 people.

Historic drought conditions along the Lower Platte River have forced public water suppliers to implement water use restrictions in the past. While these water use restrictions have helped preserve the required drinking water supply for all residents, there remains a threat that long-term drought may require Lincoln, who has a surface water right on the Platte River, to place a priority call that would result in less water for agricultural in order to maintain drinking water supplies. Other solutions have been funded and implemented, including several municipalities installing more wells to enhance their capacity during very low flows; however, all infrastructure solutions have limitations if water from the river is not able to be recharged back into the adjacent aquifer in a timely manner.

All remaining groundwater supplies across the LPNNRD, LPSNRD, and PMRNRD are under the threat of water quality contamination. In total, the three NRDs cover a combined area of 4,900 mi^2, have a population of 1.25 million people, and encompass 116 public water supply wellhead protection areas (see Table 6 and Figure 3 below). Over 90% of the population in this area gets their water from public water supplies or rural water supplies. This highlights the importance of thoroughly assessing each public water supplies wellhead protection area with the most accurate data available and combining that information with the knowledge of historic groundwater quality monitoring results to ensure that these municipal wells are afforded the best protection possible. Improved sub-regional groundwater modeling will be able to better map and distinguish the hydrogeology of wellhead protection areas.

Finally, all other residents in the three co-sponsoring NRDs rely on domestic drinking water supplies from the same groundwater aquifers. Baseline modeling of these aquifers will help inform future well construction permits and help identify or solve well interference issues.

Table 6 –Population Potentially Benefited

JURISDICTION	Total Population*	No. of Communities	NRD Size (AC)
LPNNRD	65,000	30	1,030,000
PMRNRD	813,000	34	1,145,700
LPSNRD	350,000	33	1,068,000
TOTALS	**1,228,000**	**97**	**3,243,700**

*The 2020 estimated population

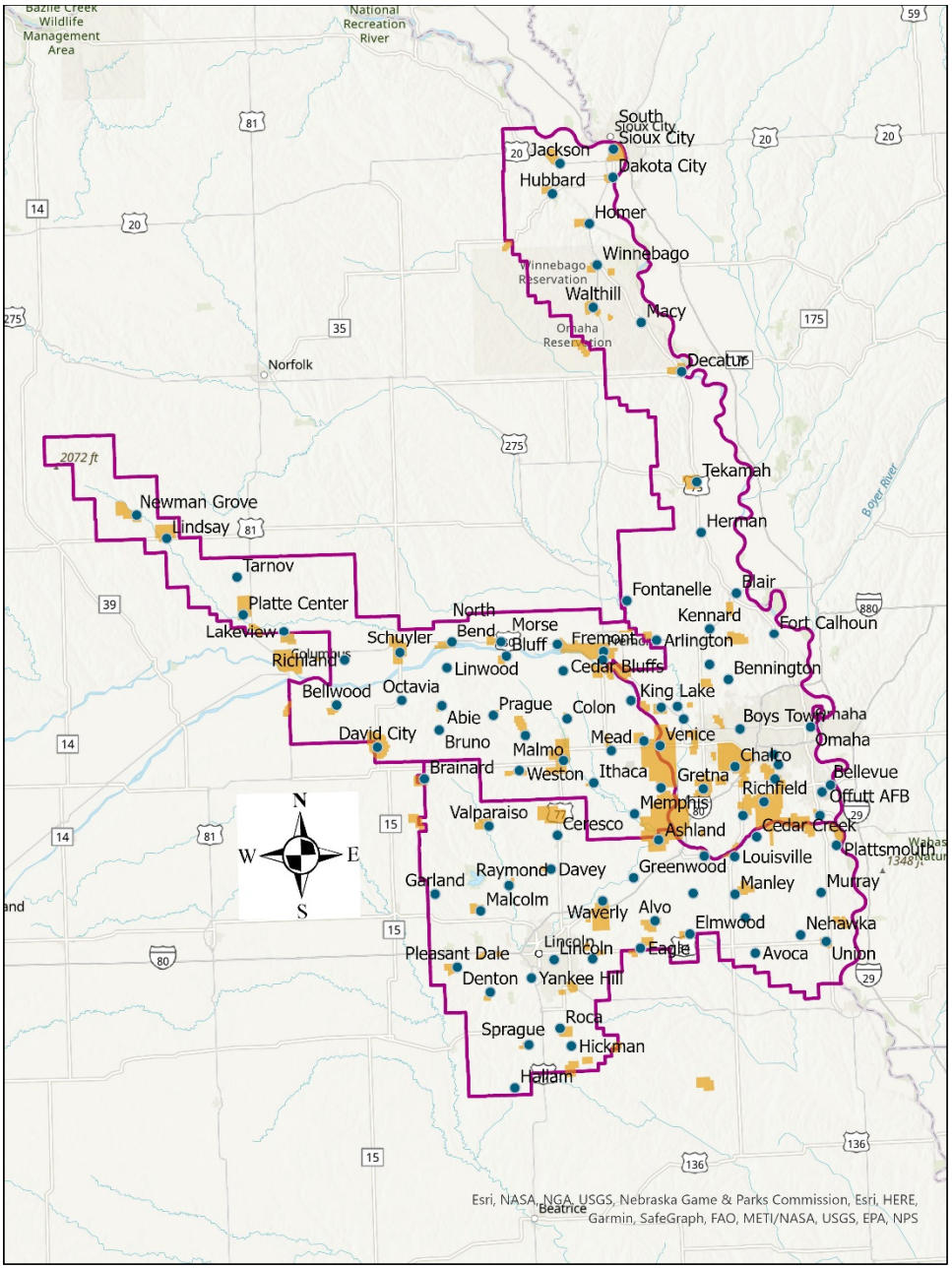

Figure 3. LPSNRD, LPNNRD and PMRNRD project area showing communities and Wellhead Protection Areas (in orange)

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 directly supports many of the goals for each of the NRDs Groundwater Management Plans (GWMPs) and IMPs. Each individual NRD's IMP is informed and conforms to recommendations from the Lower Platte River Basin Water Management Plan.

Lower Platte River Basin Water Management Plan

One of the primary outcomes of this project is the enhancement and improvement of the existing regional Lower Platte Missouri Tributaries (LPMT) Model developed by NDNR in 2018. The existing LPMT model developed is not based on the Airborne Electromagnetic (AEM) data that has been collected to comprehensively reflect the subsurface geology in Eastern Nebraska. This new sub-regional model will incorporate AEM data into the initial modeled hydrogeologic properties, have a finer grid size allowing for more detailed data to be utilized, will have historic information up to 2021 incorporated, and will be developed in the updated MODFLOW 6 framework. The new MODFLOW 6 framework will allow the new sub-regional model and the newly completed Lower Elkhorn District Model to be incorporated into an updated LPMT as a nested parent-child model, which will allow all three models to "talk" to each other. This will decrease computational errors that currently occur along model boundaries and give greater confidence in modeled results in those regions. The finalized calibrated groundwater models will be used by NeDNR to evaluate areas within each NRD that are considered hydrologically connected (HCA) between surface and groundwater and develop accurate Stream Depletion Factor (SDF) values for these HCAs. This work is being done as part of the overall analysis necessary as part of the Lower Platte River Basin Water Management Plan.

This proposed project is the culmination of over a decade worth of planning and efforts amongst the Lower Platte River Basin NRDs and NeDNR. Multiple NRDs (including Lower Loup NRD, Upper Loup NRD, Upper Elkhorn NRD, Lower Elkhorn NRD, LPNNRD, LPSNRD, and PMRNRD) and NeDNR are involved with the Lower Platte Basin Water Management Plan which covers all of the Loup River Basin, Elkhorn River Basin and Lower Platte River from Columbus to the confluence with the Missouri River. The Basin Plan requires annual accounting for peak season streamflow depletions due to any new water use development. Across much of the upper half of the Lower Platte Basin (in the Loup and Elkhorn Rivers) this accounting is based on very accurate stream SDF values derived from calibrated groundwater models. To date, the eastern (lower) half of the Lower Platte Basin (including the LPSNRD, LPNNRD, and PMRNRD) have only used SDF values derived from empirical estimates and assumed hydrologically connected areas.

Lower Platte North NRD GWMP and IMP Summary

The LPNNRD's GWMP was approved in July 1995 and implemented on January 1, 1997. The rules and regulations were updated on June 15, 2018. Both have been adopted by the LPNNRD and reviewed by NDNR. Specific goals and objectives within the GWMP that are achieved or assisted by this project include:

LPN Groundwater Management Plan (GWMP) Goals

Master Plan Goal 1 – Assure Adequate Quantity and Quality of the Stream Flow, Groundwater, and Surface Water Reservoirs within the NRD for Beneficial Uses as Prescribed by Law.
Objectives – There is a total of 13 objectives all related to working with citizens and producers to manage groundwater, assisting federal and state agencies, program development, recognizing instream flows, and wellhead protection.

#1 – Groundwater Reservoir Life
Objectives – Multiple related to establishment of a management program, groundwater management areas, phased management strategy, information and education, and agency coordination.

#2 – Management Systems Development
Objectives – Multiple listed related to aquifer mapping, water level monitoring, enhanced data collection, data analysis, installing monitoring wells, supporting studies, and agency collaboration.

LPN IMP Goals

The LPN IMP became effective on July 15, 2018, after it was developed by the LPNNRD and NDNR in a collaborative effort. An abbreviated summary of the specific goals and objectives supported by this project include:

Goal #1 – Water supply
Objectives – conduct data collection and analysis of current water supplies, determine inflows and outflows of surface water and groundwater and changes in storage

Goal #2 – Develop and maintain a District-wide water demand inventory
Objectives – Evaluate current and future water demands, impacts to streamflow, estimate future impacts

Goal #3 – Develop and implement water use policies
Objectives – Update policies, practices, and programs to improve supply, conserve, etc.

Goal #4 – Public Outreach
Objectives – Incorporate new data, technologies, and programs to enhance public outreach

Goal #5 – Basin-wide Coordination
Objectives – participate with Lower Platte River Basin Coalition, expand conjunctive management, coordinate with ENWRA, etc.

Papio-Missouri River NRD GWMP and IMP Summary

The PMRNRD's GWMP was completely revised and adopted on February 8, 2018. The rules and regulations are current as of March 1, 2018. Both have been issued by the PMRNRD and accepted by NDNR. Specific goals and objectives within the GWMP that are achieved or assisted by this project include:

PMRNRD Groundwater Management Plan Goals

Overall Goal – "The District's goal is to maintain the existing conditions of its groundwater reservoir quantity and quality – forever.

Sustainability Goal – "Water use is sustainable when it promotes healthy watersheds and aquifers, improves water quality, protects water supplies through BMPs, and manages surface and groundwater resources conjunctively to protect the ability of future generations to meet their needs."
Objectives – Water conservation, policies and procedures, BMPs, wellhead protection, fertilizer management, water quality monitoring, and cost-share programs.

PMRNRD IMP GOALS

The PMRNRD IMP became effective in August 2014, after it was developed by the PMRNRD and NDNR in a collaborative effort. An abbreviated summary of specific goals and objectives supported by this project include:

Goal #1 – Develop and implement water use policies and practices
Objectives – Utilize existing policies, manage invasive vegetation, evaluate conjunctive management projects

Goal #2 – Develop and maintain a water supply and use inventory
Objectives – Develop and implement data gathering, monitoring, and evaluation, coordinate with water suppliers

Goal #3 – Develop and implement water use educational programs for conservation
Objectives – Promote water use education, conservation, and reuse

Goal #4 – Work with upstream NRDs as part of the Platte River Basin Coalition
Objectives – Participate in Lower Platte Basin water management, evaluate conjunctive management alternatives, evaluate additional water resource supplies, maintain stream flows to protect and maintain public water supply

Lower Platte South NRD GWMP and IMP Summary

The LPSNRD's GWMP is dated April 1995. The rules and regulations are effective as of January 15, 2020. Both have been adopted by the LPSNRD and accepted by NDNR. Specific goals and objectives within the GWMP that are achieved or assisted by this project include:

LPSNRD Groundwater Management Plan Goals

Sustainability Goal – "Maintain the quantity and quality of the ground water for any beneficial use in conformation with state standards."

Objectives – Protect water quality, conserve water conservation, policies and procedures, BMPs, wellhead protection, water quality monitoring, hydrogeologic data collection, and cost-share programs.

LPSNRD IMP GOALS

The LPSNRD IMP became effective in May 2014, after it was developed with NDNR in a collaborative effort. An abbreviated summary of specific goals and objectives supported by this project include:

Goal #1 – Water Inventory
Objectives – Develop and maintain a comprehensive inventory of water supplies, water use and outflows; Project changes to water inventory due to urban and rural growth; Determine the extent of hydrologically connected ground and surface waters.

Goal #2 – Water Supply Management
Objectives – Research additional storage opportunities; locate and design wells in appropriate hydrogeologic conditions; evaluate vegetation impact on stream flows

Goal #3 – Water Use Management
Objectives – Evaluate instream flow needs

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.

   One of the top priorities of water resources management is ensuring irrigation is sustainable and a key contributor to Nebraska's economy. This project brings forth the best available scientific information to support decisions that can help ensure irrigation continues with no or limited regulation, while sustaining surface water flows within hydrologically connect areas. It is anticipated that creating an enhanced and more accurate groundwater MODFLOW model for the LPNNRD, LPSNRD, and PMRNRD will lead to optimized solutions that can help reduce both aquifer and streamflow depletions.

   Another one of the project's benefits is establishing a consistent hydrogeologic dataset and groundwater modeling across PMRNRD, LPSNRD and LPNNRD boundaries. This improved geologic assessment and sub-regional model will help inform the participating NRDs and NeDNR about ground-level geology and potential near-surface recharge, and

be used to guide future projects aimed at enhancing or protecting these groundwater recharge areas.

When complete, this groundwater modeling effort will result in a full evaluation of the hydrologically connected (10/50) areas within the three Lower Platte River NRDs. Such baseline sub-regional modeling can also be used for future beneficial purposes, including but not limited to:

- Enhanced calibration with streamflow and groundwater elevation data to complete 3D models of the groundwater surface and groundwater in storage.
- Streamflow depletion calculations and assessments
- Modeling for future drought mitigation solutions or streamflow augmentation
- New well permit models and well interference impacts
- Groundwater recharge, vadose zone and water quality contamination assessments
- Wellhead protection area particle tracking and mapping

The project is designed to open the door for future long-term benefits by having a consistent hydrogeologic dataset and groundwater modeling with neighboring NRDs based on AEM data and the most recent historic hydrologic data. This project's approach, key tasks, and costs are based on similar work completed by Lower Elkhorn Natural Resource District (LENRD) and NDNR.

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.

One of the primary outcomes of this project is the enhancement and improvement of the existing regional Lower Platte Missouri Tributaries (LPMT) Model developed by NDNR in 2018. The existing LPMT model developed is not based on the Airborne Electromagnetic (AEM) data that has been collected to comprehensively reflect the subsurface geology in Eastern Nebraska. This new sub-regional model will incorporate AEM data into the initial modeled hydrogeologic properties, have a finer grid size allowing for more detailed data to be utilized, will have historic information up to 2021 incorporated, and will be developed in the updated MODFLOW 6 framework.

The new MODFLOW 6 framework will allow the new sub-regional model and the newly completed Lower Elkhorn District Model to be incorporated into an updated LPMT as a nested parent-child model, which will allow all three models to "talk" to each other. This will decrease computational errors that currently occur along model boundaries and give greater confidence in modeled results in those regions. The finalized calibrated groundwater models will be used by NeDNR to evaluate areas within each NRD that are considered hydrologically connected (HCA) between surface and groundwater and develop accurate Stream Depletion Factor (SDF) values for these HCAs. This work is being done as part of the overall analysis necessary as part of the Lower Platte River Basin Water Management Plan

Upon completion of the HCA scenario analysis, the final model review, and documentation of the sub-regional model, NeDNR will have full access to the new model and will have the ability to incorporate it into the LPMT model. It is intended that this new model, the Lower Elkhorn District model, and the LPT model be utilized for stream depletion analysis prior to the end of the Lower Platte River Basin Plan second increment in 2026. The schedule for this project is based on meeting this milestone, see below.

2nd Qtr. - 2023	3rd Qtr. - 2023	4th Qtr. - 2023	1st Qtr. - 2024	2nd Qtr. - 2024	3rd Qtr. - 2024	4th Qtr. - 2024	1st Qtr. - 2025	2nd Qtr. - 2025	3rd Qtr. - 2025
Consultant Selection and Data Compilation	Model Development				1st round Calibration and Analysis			2nd round Calibration and Analysis	Scenario Runs and Documentation

Long-term groundwater modeling analysis is beneficial to all aspects of water resource planning, including surface water modeling scenarios. Historic modeling of streamflow from groundwater models can be used in planning for municipal and industrial uses, wildlife habitat, and water storage or reservoir analysis.

Streamflow analysis is also very important in maintaining instream flow requirements on the Lower Platte to provide minimal aquatic habitat for T&E species. This project would aid the state and NRDs in managing groundwater and surface water to meet its obligation under the instream flow appropriation permit granted to the Nebraska Game and Parks Commission for the central and lower Platte River on June 26, 1998 (with a instream flow priority date of November 30, 1993). The river supports abundant wildlife and is home to three species listed under the federal Endangered Species Act: the endangered pallid sturgeon and least tern, and the threatened piping plover.

5. Maximizes the beneficial use of Nebraska's water resources for the benefit of the state's residents;

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

This project will enhance the LPNNRD, LPSNRD and PMRNRD's ability to manage water for beneficial uses with an impact to a total population of over 1.25 million. Better informed water management in the Lower Platte River Basin would also benefit the City of Lincoln, Omaha's MUD Water Systems, and all other public water suppliers located on, or near, the Platte River (see enclosed letters of support).

A specific topic of statewide interest that will be benefited by this project in the future is using the new models to evaluate projects that may reduce the impacts of severe drought on the Lower Platte River and specifically the impact to Omaha and Lincoln water supplies. Drought was addressed as part of the Lower Platte River Drought Contingency Plan, completed in October 2019. There were several action items suggested in that plan, including new reservoirs, pumping from sandpits, and release from upstream sources to ensure an adequate supply to Lincoln and Omaha water supplies. Sound water management decisions throughout the Lower Platte Basin will benefit streamflows, which

in turn, increase flows in the Platte River. Increased flows in the Platte, especially during drought, reduce the chances of either Lincoln or Omaha using their authority under Nebraska Revised Statue 46-233 for 'induced groundwater recharge' which could cause irrigators upstream of the Lincoln and Omaha wellfields to cease surface water irrigation when water level triggers reach a certain threshold. This project will help evaluate a preferred alternative should action be taken as a result of the Drought Contingency Plan.

The NRDs are also helping ensure rural residential, commercial, and industrial development has a sustainable water supply, in addition to agricultural water management. This project improves how the NRD staff and Board of Directors can work one-on-one with agricultural producers, developers, municipalities, and industries. Once the baseline groundwater model is developed, it will be provided to the along within a web-based tool to allow NRDs or developers to modify the model and evaluate new well impacts. This tool will provide benefits to 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.

By completing the sub-regional model together, there is considerable cost savings (~$200,000), versus all three NRDs developing models individually. The project approach, key tasks, and costs estimates are based on a proven methodology from an identical project completed by the LENRD and NeDNR to construct a district-scale numerical groundwater flow modeling project. The LENRD project has provided a means for other NRDs to follow with an approach that was successful in converting AEM data into a hydrogeologic framework and creation of groundwater modeling files. The estimated cost for this project is shown in Table 7.

Table 7 – Cost by Task and Year

TASK	TITLE	COST (2023)	COST (2024)	COST (2025)
1	PM/Meetings	$20,000	$20,000	$20,000
2	Develop Model(s)	$270,000	$0	$0
3	Calibrate Model(s)	$0	$140,000	$0
4	Model Analysis	$0	$140,000	$0
5	Review and Reporting	$0	$0	$50,000
	ANNUAL TOTAL	**$290,000**	**$300,000**	**$70,000**

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.

This project will help the LPNNRD, LPSNRD, and PMRNRD work with the rest of the Lower Platte River Coalition to achieve basin-wide goals of 'not being fully or over-appropriated'. The NRDs understand that the potential to become fully appropriated is real and water management needs to be addressed in a consistent manner amongst each NRD. Datasets and information analyzed as part of this project will allow for smarter water management decisions and will result in a robust sub-regional groundwater flow model for the entire three NRD area. This project will reduce the chances of the State needing to intervene with further IMP requirements.

Groundwater and streamflow analysis is also very important in maintaining instream flow requirements on the Lower Platte to provide minimal aquatic habitat for T&E species. This project would aid the state and NRDs in managing groundwater and surface water to meet its obligation under the instream flow appropriation permit granted to the Nebraska Game and Parks Commission for the central and lower Platte River on June 26, 1998 (with a instream flow priority date of November 30, 1993). The river supports abundant wildlife and is home to three species listed under the federal Endangered Species Act: the endangered pallid sturgeon and least tern, and the threatened piping plover.

A specific topic of statewide interest that will be benefited by this project in the future is using the new model to evaluate projects that may reduce the impacts of severe drought on the Lower Platte River and specifically the impact to Omaha and Lincoln water supplies. Drought was addressed as part of the Lower Platte River Drought Contingency Plan, completed in October 2019. There were several action items suggested in that plan, including new reservoirs, pumping from sandpits, and release from upstream sources to ensure an adequate supply to Lincoln and Omaha water supplies. Sound water management decisions throughout the Lower Platte Basin will benefit streamflows, which in turn, increase flows in the Platte River. Increased flows in the Platte, especially during drought, reduce the chances of either Lincoln or Omaha using their authority under Nebraska Revised Statue 46-233 for 'induced groundwater recharge' which could cause irrigators upstream of the Lincoln and Omaha wellfields to cease surface water irrigation when water level triggers reach a certain threshold. This project will help evaluate a preferred alternative should action be taken as a result of the Drought Contingency Plan.

The proposed project will also help promote water conservation which will have a positive cumulative impact on stream flow by minimizing aquifer depletion. More educated decisions can be made by each NRD, particularly within the hydrologically connected areas, which will help reduce pumping impacts on streamflow. The beneficial impacts will be maximized in areas with the highest stream flow depletion factor (SDF) as defined by the modeling and HCA analysis.

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.

Protection of private property owner's ability to irrigate, with no or minimal regulation, is one of the largest goals to be achieved using the information to be provided by this project. Sound water management requires the use of the best available science, in this case AEM data, ensuring a sustainable water supply for not only irrigators, but also municipalities (including Lincoln and Omaha), and thousands of private well owners.

A severe drought could lead to Lincoln and Omaha utilizing their authority under Nebraska Revised Statue 46-233 for 'induced groundwater recharge' which could cause irrigators upstream of the Lincoln and Omaha wellfields to cease surface water irrigation when water level triggers reach a certain threshold. While necessary to supply municipal water sources, limiting irrigation harms the state's economy. This project may have the ability to help prevent such a priority call from occurring depending on accurate groundwater modeling and management decisions.

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 will provide information that can improve the understanding of the extent and connectedness of groundwater resources, as well as the types of materials overlying the resource. That information can be utilized to improve or create programs or projects that directly improve water quality across the three NRDs and the political boundaries with LENRD.

An immediate and specific benefit to water quality is using the model to accurately refine boundaries of groundwater management sub-areas. The groundwater model will help determine flow patterns, where pollutants (mainly nitrates) are originating, and where to create programs to limit nitrate leaching in the future. This allows for targeting the most vulnerable areas susceptible to leaching of nitrates into the groundwater supply in vulnerable areas, and the planning for providing cost-share programs to encourage BMP adoption.

Using results from the groundwater flow model will improve near-surface recharge estimates and help identify groundwater areas vulnerable to direct recharge contamination. The only other solution at this time is to rely on USDA soil survey information which only extends to 5 feet below ground surface (bgs). AEM data and modeling can provide recharge and vulnerability information deeper into the soil profile and vadose zone.

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.

NeDNR, PMRNRD, LPSNRD and LPNNRD are financially supporting this project. All three NRD's have placed funding in their FY 2022-2023 budgets. This project will be completed during from calendar year 2023 through 2025. Letters of support and financial assurance can be found in Attachment A. Information on each of agency's budget and financial resources are described below:

Nebraska Department of Natural Resources
The NeDNR is contributing $196,725 or ~29.8% of the project total and has committed this funding over the next three years (2023 – 2025)

Papio-Missouri River Natural Resources District (PMRNRD)
The PMRNRD is contributing $71,091.67, or ~10.8% of the project total. The PMRNRD has estimated the 2022-2023 property tax request at 0.035669 cents per $100 of valuation resulting in $30,185,961 from property taxes, and a total operating budget of $105,787,464.

Lower Platte South Natural Resources District (LPNNRD)
The LPNNRD is contributing $71,091.67, or ~10.8% of the project total. The LPSNRD's proposed FY 22 – 23 operating budget is $36,684,328 with $10,156,870 of that required from the local tax levy.

Lower Platte North Natural Resources District (LPNNRD)
The LPNNRD is contributing $71,091.67, or ~10.8% of the project total. The LPNNRD's FY 21-22 operating budget was $8,217,366 with $4,141,372 of that required from LPNNRD local tax levy. The 2022-2023 budget is anticipated to be similar.

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

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

This proposed sub-regional groundwater modeling project is the culmination of over a decade worth of planning and efforts amongst the Lower Platte River Basin NRDs and NeDNR. Multiple NRDs (including Lower Loup NRD, Upper Loup NRD, Upper Elkhorn NRD, Lower Elkhorn NRD, LPNNRD, LPSNRD, and PMRNRD) and NeDNR are involved with the Lower Platte Basin Water Management Plan which covers all of the Loup River Basin, Elkhorn River Basin and Lower Platte River from Columbus to the confluence with the Missouri River. The Basin Plan requires annual accounting for peak season streamflow depletions due to any new water use development. Across much of the upper half of the Lower Platte Basin (in the Loup and Elkhorn Rivers) this accounting is based on very accurate stream depletion factors (SDF) derived from calibrated groundwater models. To date, the eastern (lower) half of the Lower Platte Basin (including the LPSNRD, LPNNRD, and PMRNRD) have only used SDF values derived from empirical estimates and assumed hydrologically connected areas.

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The new MODFLOW 6 framework will allow the new sub-regional model and the newly completed Lower Elkhorn District Model to be incorporated into an updated LPMT as a nested parent-child model, which will allow all three models to “talk” to each other. This will decrease computational errors that currently occur along model boundaries and give greater confidence in modeled results in those regions. The finalized calibrated groundwater models will be used by NeDNR to evaluate areas within each NRD that are considered hydrologically connected (HCA) between surface and groundwater and develop accurate Stream Depletion Factor (SDF) values for these HCAs. This work is being done as part of the overall analysis necessary as part of the Lower Platte River Basin Water Management Plan.

Lower Platte Basin Coalition – Basinwide Water Management Plan

This project helps achieve the three listed purposes of the LPBC Basin Water Management Plan (October 2017) by making use of the investment in AEM data and providing a consistent hydrogeologic sub-regional model across NRD boundaries, increasing the capability for NRDs to management cross-basin water issues.

“The purpose of this Plan is to:

1) *Provide guidance and a framework for Coalition members to develop water use policies and practices that contribute to the protection of existing surface and groundwater uses, while allowing for future water development.*
2) *Assist in the development and maintenance of a water supply and use inventory, based on the best available data and analysis.*
3) *Provide consistency and information for incorporation into individual NRD Integrated Management Plans.”*

The goals of the LPBC Basin Water Management Plan are:

1) Develop and maintain a water supply and use inventory based on the best available data and analysis.
2) Implement a water management plan for the Basin that maintains a balance between current and future water supplies and demands.
3) Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

This project helps support implementation of multiple water supply goals, including, agricultural use, municipal and industrial uses, conservation of water resources, and preservation of water resources, as listed in both NRDs IMPs and GWMPs.

12. Addresses a statewide problem or issue;

- List the issues or problems addressed by the project and why they should be considered statewide.
- Describe how the project will address each issue and/or problem.
- Describe the total number of people and/or total number of acres that would receive benefits.
- Identify the benefit, to the state, this project would provide.

The creation and use of a sub-regional groundwater model will help inform proactive management decisions and in turn prevent a potential fully appropriated designation by the State on hydrologically connected areas within the respective NRDs. This project will help the LPNNRD, LPSNRD and PMRNRD work with other Lower Platte River NRDs, including LENRD, to achieve the NDNR's goal of having all basins 'not fully or overappropriated'.

The NRDs understand that the potential to become fully appropriated is real and more attention will be given to water management policies as time goes on. Datasets and information analyzed will allow for smarter water management decisions and will result in a robust sub-regional groundwater flow model for the entire area of the LPSNRD, LPNNRD, and PMRNRD. This project will reduce the chances of the State needing to intervene with further IMP requirements.

Areas of the LPSNRD, LPNNRD and PMRNRD are home to three federally listed endangered species in the Lower Platte Basin. This project will assist the state and NRDs in managing groundwater and surface water to meet its obligation under the instream flow appropriation permit granted to the Nebraska Game and Parks Commission for the central and lower Platte River on June 26, 1998 (with a instream flow priority date of November 30, 1993).

Sound water management decisions throughout the Lower Platte Basin will benefit streamflows, which in turn, increase flows in the Platte River. Increased flows in the Platte, especially during drought, reduce the chances of either Lincoln or Omaha using their authority under Nebraska Revised Statue 46-233 for 'induced groundwater recharge' which could cause irrigators upstream of the Lincoln and Omaha wellfields to cease surface water irrigation when water level triggers reach a certain threshold. This project

may have the ability to help prevent such a priority call from occurring depending on accurate groundwater modeling and management decisions.

The estimated population, shown in Table 8, to benefit from this project includes the estimated population of LPSNRD, LPNNRD and PMRNRD.

Table 8 –Population Potentially Benefited

JURISDICTION	Total Population*	No. of Communities	NRD Size (AC)
LPNNRD	65,000	30	1,030,000
PMRNRD	813,000	34	1,145,700
LPSNRD	350,000	33	1,068,000
TOTALS	**1,228,000**	**97**	**3,243,700**

*The 2020 estimated population

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 total cost of the entire project is estimated to be $660,000. All sources of funding will be applied to contracted professional services responsible for creating, running, and documenting new sub-regional groundwater models for the area covered by the LPNNRD, LPSNRD and P-MRNRD. All sources of funding have been confirmed over an anticipated three-year project schedule and are documented in attached letters of support. The projected cost-share for this WSF Grant Application is shown below:

Table 9 – Total Cost and Cost-Share Breakdown

Entity	Yearly Contribution	Total Contribution
Papio	$23,697.22	$71,091.67
LPS	$23,697.22	$71,091.67
LPN	$23,697.22	$71,091.67
NeDNR	$65,575.00	$196,725.00
WSF		$250,000.00
Project Total		$660,000.00

Entity	Total Contribution	Percentage
NRDs	$213,275.01	32.3%
NeDNR	$196,725.00	29.8%
WSF	$250,000.00	37.9%

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 LPNNRD, LPSNRD and PMRNRD have approved IMPs and are active partners in support of implementation the Lower Platte River Drought Contingency Plan and Lower Platte River Basin Coalition Basin Water Management Plan. These four plans include similar goals aimed at maintaining adequate flows in the Elkhorn River and Lower Platte Rivers, and associated tributaries. Understanding the hydrological connection between groundwater and surface water is paramount in the success of these planning efforts and will direct actions within each NRD to maintain adequate flows through sound groundwater management.

The sub-regional groundwater model will provide information to enhance integrated management decisions, ultimately leading to actions that will safeguard, or enhance streamflow as water demand and supply are balanced. This in turn directly contributes to watershed health and function, especially in the Lower Platte River, home to the endangered pallid sturgeon and least tern, and the threatened piping plover and a source of drinking water to Lincoln and Omaha.

This project will assist the state and NRDs in managing groundwater and surface water to meet its obligation under the instream flow appropriation permit granted to the Nebraska Game and Parks Commission for the central and lower Platte River on June 26, 1998 (with a instream flow priority date of November 30, 1993).

The primary major watersheds benefited through this project include: Shell Creek, Salt Creek, Papillion Creek, Lower Platte River, Lower Elkhorn River, and Missouri River tributaries.

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.

NDNR Annual Report and Plan of Work - 2020

In Sept. 2020, the NeDNR completed the most current Annual Report and Plan of Work. NeDNR utilizes several of its program areas to implement the state water planning and review process. Five of the six implementation objectives identified in the Annual Plan of Work will be addressed through this project. They include:

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

This objective is achieved with the creation of a sub-regional groundwater model for the LPNNRD, LPSNRD, and PMRNRD. NeDNR is consulting with all three NRDs, providing data, product reviews, and technical support.

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

NeDNR staff are involved with ENWRA and individual NRDs to support IMP implementation. Staff have been supporting this application and will be supporting the sub-regional model development and analysis.

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

The LPNNRD, LPSNRD and PMRNRD are working collaboratively with NeDNR to establish a groundwater flow model utilizing AEM. This model will be used by the NRDs and NeDNR to model stream depletion factors and map hydrologically connected groundwater and surface water supplies.

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

NA

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

This project is a shining example of collaboration as multiple NRDs work together to create consistent datasets allowing for water resource management crisply across political boundaries. This interagency collaboration will reduce future conflicts between NRDs, NeDNR, and other agencies related to water management in the Lower Platte River.

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

The resulting model documentation will be comprehensive in scope and will underscore how the model was derived, its uses, and its limitations. The collaborating NRDs and NeDNR will be sharing the model and its accompanying documentation with the public after finalization. All scenario results derived from the model for decision making will be presented to the public during meetings subject to the Open Meeting Act. All effort will be made by the NRDs and NeDNR to make any accompanying processes and results understandable to the general public and will have those who expertise in the utilization of models available to answer questions at that time. Openness to the public on how the data is utilized and educating them on the usefulness and drawbacks of the various modeling efforts undertaken is important to the NRDs and NeDNR as it creates trust in the procedures and tools being employed.

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