

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Little Blue NRD Hydrogeologic Assessment

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

Sponsor Business Name: Little Blue Natural Resources District

Sponsor Contact's Name: Scott Nelson, General Manager

Sponsor Contact's Address: 100 E 6th Street, Davenport, NE 68335

Sponsor Contact's Phone: 402-364-2145

Sponsor Contact's Email: snelson@littlebluenrd.org

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

Grant amount requested. \$ 85,800

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

If a loan is requested amount requested. \$ N/A

- 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"/>

There are no permits necessary.

4. **Partnerships**

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

The Little Blue Natural Resources District (LBNRD) is the sponsor and will work with neighboring NRDs to obtain information to support the LBNRD Hydrogeologic Assessment and Report (Assessment). This includes Lower Republican NRD, Tri-Basin NRD, Central Platte NRD, Upper Big Blue NRD, and Lower Big Blue NRD. The Kansas Geological Survey (KGS) will also be contacted to obtain well log

information. The LBNRD will work along with the Nebraska Department of Natural Resources (NeDNR) staff during development of the Assessment.

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

LBNRD

The LBNRD is the lead agency and fiscal agent. They will work directly with NeDNR staff to manage the grant and obtain technical review during development of the Assessment. The LBNRD will also hire a qualified consultant to perform the work.

NeDNR

The NeDNR staff will have an opportunity to support development of the Assessment, review data and information, and participate in progress meetings.

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 cost of the entire project is \$143,000 and a breakdown is provided in Table 1. The LBNRD has approved the local cost share match as part of the FY2023 budget. There are no other sources of funding applied to the project. Should the WSF not be obtained, the LBNRD would try again in 2023 or consider other options.

Table 1: Project Task and Funding Summary

TASK	COST ESTIMATE	WSF Grant Request	Local Cost Share
		60%	40%
Project Management / Meetings	\$ 13,000	\$ 7,800	\$ 5,200
Hydrogeologic Assessment Framework	\$ 80,000	\$ 48,000	\$ 32,000
Deliverables / Map Book	\$ 50,000	\$ 30,000	\$ 20,000
Total	\$ 143,000	\$ 85,800	\$ 57,200

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!

Rising nitrate contamination concerns in aquifers, competing demands for water, groundwater recharge goals, public education, educating operators, and having a scientific basis for groundwater rules and regulations are driving factors for the LBNRD to establish a new Hydrogeologic Assessment and Report (Assessment).

In 2011, the LBNRD Hydro-Geologic Study (2011 Study) was completed and included evaluation of available NeDNR well geologic logs and University of Nebraska-Lincoln Conservation and Survey Division (UNL-CSD) test hole logs. At that time, there were approximately 12,000 data points available within a 5-mile buffer of the LBNRD boundary, but did not include well log information in Kansas. The updated Assessment will include the same 5-mile buffer of the LBNRD boundary, which now includes approximately 18,600 geologic logs total, including the area in Kansas. This total includes:

- A total of 10 new UNL-CSD test holes.
- Approximately 400 well logs in Kansas available from the KGS that were not previously evaluated.
- A total of 6,100 additional well logs in Nebraska, which includes new wells since the 2011 Study and decommissioned wells added to the NeDNR database.

The data collection, analysis, and interpolation process will take advantage of, and build upon, the work completed for the 2011 Study and also be based in Geographic Information System (GIS) software. The updated Assessment will feature an increase in the number of hydrogeologic cross sections to approximately 25, whereas there are only five across the LBNRD from the 2011 Study. The hydrogeologic cross sections will be located through critical areas, such as municipal wellfields and wellhead protection areas, fringe aquifer areas, and other areas as directed by the LBNRD staff and Board of Directors (Board).

The Assessment will also include the following key additional or updated maps:

- **Groundwater Resource Development Risk** - An updated version of the Aquifer Risk. This map will provide a qualitative assessment of groundwater available to support high-capacity well development.
- **Groundwater Resource Geologic Vulnerability** - This map will display risk in relation to quality and identify areas most vulnerable to nitrate contamination based upon the key parameter clay thickness, which if significant enough, can reduce the downward migration of contaminants to

the aquifer. This map will benefit communities working to address challenges from rising nitrates, well siting efforts, wellhead protection, and the groundwater management area regulations and decision making.

- **Potential Groundwater Recharge** - This map will be based on the depth to the Principal Aquifer, unsaturated clay thickness, and depth of the unsaturated Principal Aquifer (unconfined) to help identify areas where recharge could be more effective in areas where the overlying clay is located and where greater unsaturated material exists for storage.
- **Target Potential AEM Areas** - The addition of a map showing locations for potential Airborne Electromagnetic (AEM) flights to gather additional data in sensitive areas.
- **Vadose Assessment Studies** – This map will show the location of past studies and can be used in conjunction with the vulnerability map to better assess aquifer vulnerabilities. The map will help LBNRD determine where future vadose assessments should occur.
- **Existing Observation Network and Recommendations** – This map will show the locations of the existing network along with historical water level hydrographs and any nitrate concentration data. In addition, areas where new observation wells, for water quality and quantity, should be considered to enhance data collection efforts and maximize the best scientific information available to support water management decisions.

Once complete, the results from this Assessment could be used to assist LBNRD staff with the following:

- Evaluating new well development requests and siting new monitoring wells more efficiently.
- Establishing a better understanding of aquifer characteristics such as boundary conditions, potential recharge areas, and aquifer vulnerability based on the most recent information available.
- Completing vulnerability assessments and identify locations in greater need of best management practices.
- Identifying areas for more effective groundwater recharge projects.
- Better define hydrologically connected surface water and groundwater.
- Developing conceptual hydrogeologic models that could be used to build numerical groundwater flow models, such as MODFLOW.
- Provide visuals and maps for operator training classes.

7. **Project Tasks and Timeline**

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

- 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 one-year project includes three major tasks: project management and meetings, the hydrogeologic assessment framework, and producing the deliverables. The project will start January 2023 and be complete before the end of the year.

Table 2: Project Task and Funding Summary

TASK	COST ESTIMATE	SCHEDULE
Project Management / Meetings	\$ 13,000	2023
Hydrogeologic Assessment Framework	\$ 80,000	2023
Deliverables / Map Book	\$ 50,000	2023
Total	\$ 143,000	

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);

Currently, the LBNRD utilizes the 2011 Study as the best available scientific basis for making water management decisions. A summary of how the LBNRD has used this information includes:

- Irrigation well spacing in the LBNRD is set at 1,000 feet, within the Very High Risk area spacing is 1,250 feet, more stringent than state setbacks.
- There is only one high capacity well allowed per 80 acres in the Very High Risk area.
- New well permits are ranked using the Transmissivity, Specific Yield, Saturated Sand, and using water level data from 2000-2007, and review of the potential for Recharge maps.
- A minimum value of 100 must be met, if not then the producer is allowed to drill, and test pump the well in a time frame of August 1st through September 31st.
- The test well must produce 400 gpm as an instant and cumulative flow or permit will not be signed and well must be abandoned.
- There is a permanent stay in the area noted as “Aquifer Less Than 10 Feet Thick”. In the past, some high-capacity wells were being installed in limestone and/or sandstone formations in this area, in some cases historically causing a negative impact to domestic or other high-capacity wells.

The 2011 Study has been implemented as it was designed, but since it was established, more data is now available and there are more advanced methods to assess and visualize the data. The foundation of the Assessment is geologic data. The project will place all available geologic data into one GIS that will be used to make new and updated maps. Approximately 6,500 additional data points are now available since 2011, all of which will be reviewed and incorporated into the Assessment. This includes 400 well logs within the 5-mile buffer area in Kansas. The Assessment will be more robust and include detailed information on areas where LBNRD staff and Board face the most frequent challenges, specifically related to development request for high-capacity wells.

The Assessment will be developed under oversight of a professional geologist licensed in the State of Nebraska. Additionally, the approach and methodology will follow that of recently completed similar type projects for Lower Elkhorn, Papio-Missouri River, Lower Platte North, and Nemaha NRDs.

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

Development of the Assessment will be based upon three major tasks:

- 1) **Project Management and Meetings** – includes coordination with LBNRD staff, Board, and other stakeholders. Two in-person meetings including a kickoff and

final deliverables review, progress reports, and one presentation to the Board of Directors to describe the results of the Assessment and educate them on the benefits of the map book and associated GIS data.

- 2) **Hydrogeologic Assessment Framework** – includes obtaining new data, review of the 2011 Study, completing the assessment by creating raster surfaces of hydrogeologic data using ArcGIS Spatial Analyst, constructing 20 to 25 hydrogeologic cross sections, and a desktop review of the monitoring well network.

- 3) **Production of Deliverables** – creation of maps showing hydrostratigraphic surfaces, updated maps from the 2011 Study, new maps including NRD-wide vulnerability rating, areas for artificial recharge potential, and updated high-capacity well development risk maps. Includes a written summary within the map book including an introduction, purpose, approach, methodology, description of figures, metadata, and references. The written summary will include recommendation for improvements to the well observation network.

The overall approach for development of the Assessment shown in Figure 1.

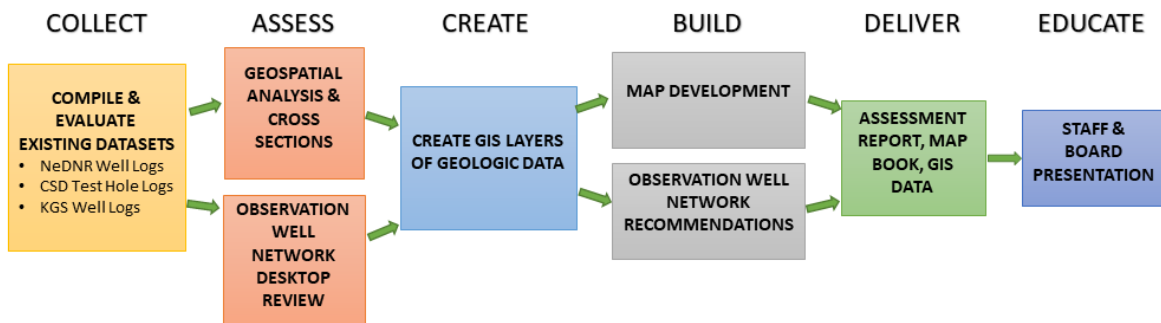


Figure 1 – Assessment Development General Approach

The 2011 Study included evaluation of available NeDNR well geologic logs and UNL-CSD test hole logs totaling approximately 12,000 within a 5-mile buffer of the LBNRD boundary. The updated Assessment will include the same 5-mile buffer (see Figure 2) of the LBNRD boundary, which now includes approximately 18,600 geologic logs total. This total includes 10 new UNL-CSD test holes, approximately 400 well logs in Kansas available from the Kansas Geological Survey (KGS), and 6,100 additional well logs in Nebraska, which includes new wells since the 2011 Study and decommissioned wells added to the NeDNR database.

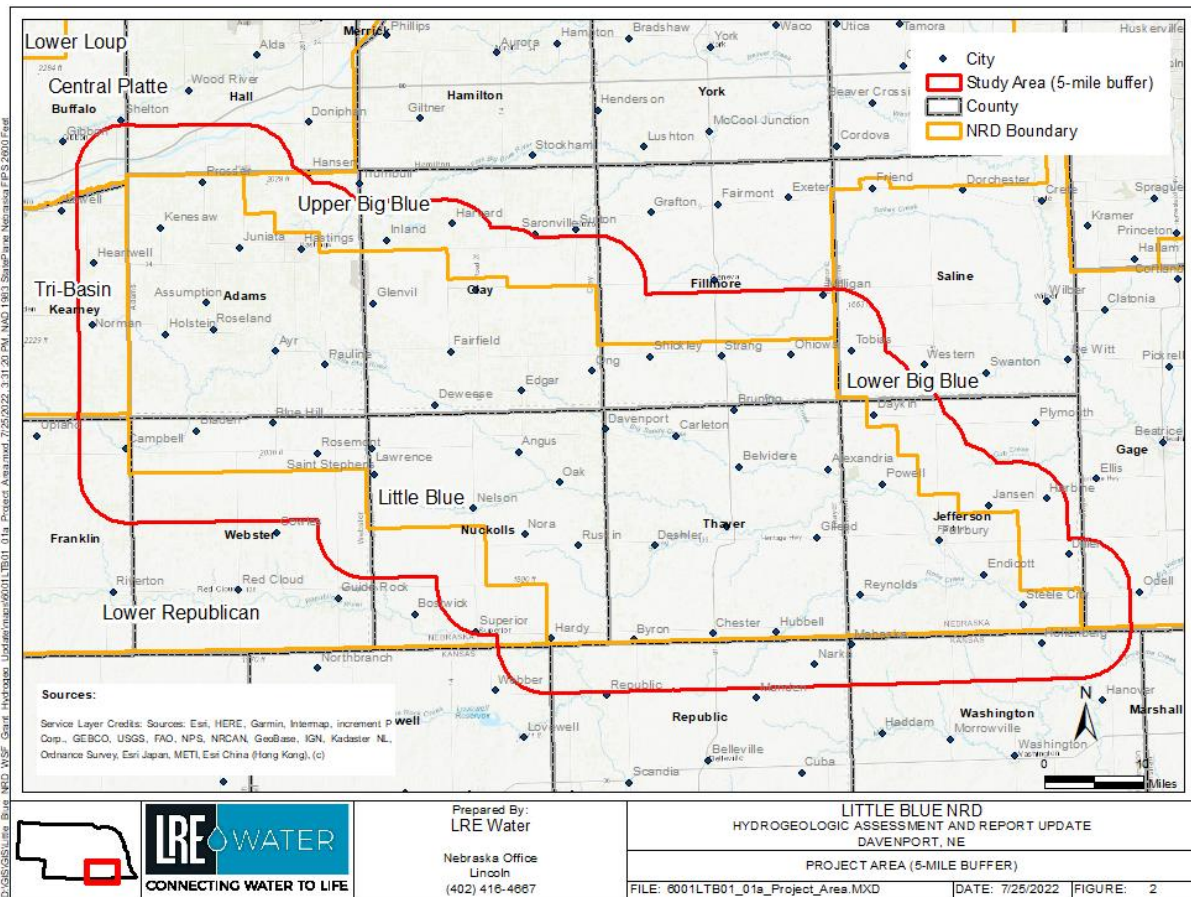


Figure 2 – Project Area

The number of hydrogeologic cross sections will be expanded to approximately 25, whereas there are only five across the LBNRD from the 2011 Study. The hydrogeologic cross sections will be located through critical areas, such as municipal wellfields and wellhead protection areas, fringe aquifer areas, and other areas as directed by the LBNRD staff and Board. An example of a typical hydrogeologic cross section, including nitrate data, is shown in Figure 3. The cross section shows clay, till, and loess as white, sand and gravel as yellow, displays the elevation of the land surface and bedrock, and displays all wells, and well screen elevations (if available).

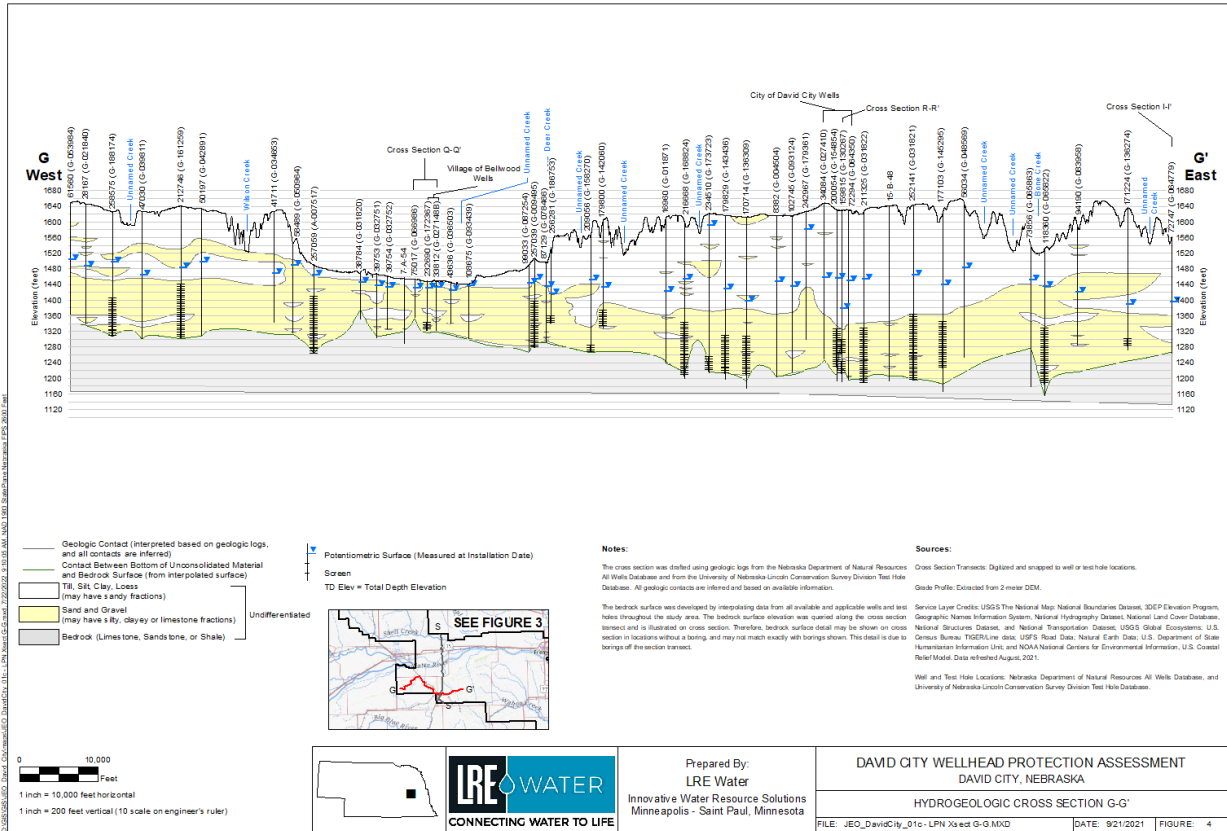


Figure 3 – Typical Hydrogeologic Cross Section

The Assessment will also include a desktop review of the district’s 65 observation wells that have dedicated data loggers (Figure 4). These wells are used for monitoring groundwater quality and quantity throughout the district. The purpose of this review will be to evaluate this monitoring well network and make recommendations for continued monitoring and also modifications to the network to improve groundwater quantity and groundwater quality evaluations, and to support future decision making. This will include a review of each well’s location, depth, screening interval, and lithology, and the potential influence from surrounding irrigation wells. If nitrate data are available, historical concentrations will also be plotted with the hydrograph for each well.

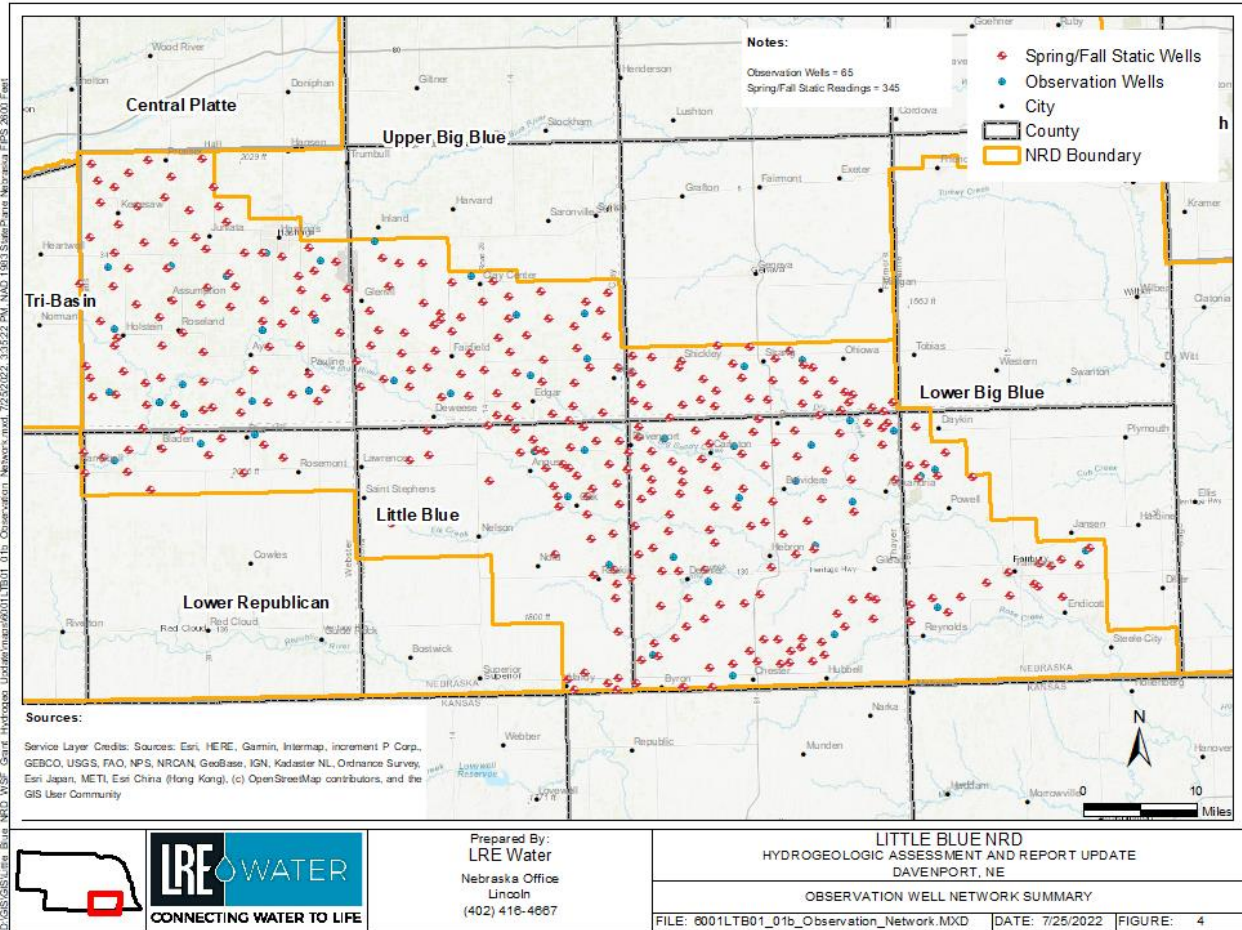


Figure 4 – Observation Well Network Summary

The Assessment will include the following key additional or updated maps:

- 1) **Groundwater Resource Development Risk** - An updated version of the Aquifer Risk map in the 2011 Study. This map will be updated and provide a qualitative assessment of groundwater available to support high-capacity well development.
- 2) **Groundwater Resource Geologic Vulnerability** - This map will display risk in relation to quality. This map will identify areas most vulnerable to nitrate contamination based upon the key parameter clay thickness, which if significant enough, can reduce the downward migration of contaminants to the aquifer. This map will benefit future well siting efforts, wellhead protection, and groundwater management area decision making.
- 3) **Potential Groundwater Recharge** - This map will be based on the depth to the Principal Aquifer and also unsaturated clay thickness and unsaturated Principal Aquifer (unconfined) to help identify areas where recharge be more effective in areas where the overlying clay is this and where greater unsaturated material exists for storage.

- 4) **Target Potential AEM Areas** - The addition of a map showing locations for potential AEM flights to gather additional data in sensitive areas.
- 5) **Vadose Assessment Studies** – This map will show the general location of past studies and can be used in conjunction with the vulnerability map to better assess aquifer vulnerabilities.
- 6) **Existing Observation Network and Recommendations** – This map will show the locations of the existing network along with historical water level hydrographs and any nitrate concentration data. In addition, areas where new observation wells, for water quality and quantity, should be considered to enhance data collection efforts and maximize the best scientific information available to support water management decisions.

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

There are no field research investigations planned for this project. The project is supported by existing geologic and hydrogeologic datasets currently available to LBNRD and its contractor.

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).

No effects to development and/or 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 next best alternative would be to collect geophysical data, such as AEM survey, however, at the present time, LBNRD has not flown AEM. The most cost-effective alternative is to utilize all existing point-based geologic data including NeDNR well logs, UNL CSD test holes, and Kansas Geological Survey (KGS) well logs and to build off the work completed for the 2011 Study. The Assessment will also incorporate information from existing maps, studies, and other similar information.

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 project cost estimate is \$143,000 and was provided by LRE Water, a team that includes four staff members that worked on the original 2011 Study. The team is led by a hydrogeologist licensed as a professional geologist in the State of Nebraska. The consultant team has also recently completed similar type projects for Lower Elkhorn, Papio-Missouri River, Lower Platte North, and Nemaha NRDs; and is working with Lower Platte South NRD currently. The basis for the cost is generally associated with the number of well logs within the area, level of effort to update and produce new figures, and the desktop review of the existing monitoring well network.

The primary benefit is creating accurate and up-to-date scientifically based information to share with agricultural producers, community representatives, and similar constituents of the LBNRD when making tough decisions related to water management. The LBNRD has more confidence in decision making when hydrogeologic data is readily available in a highly visual manner, easy to share with the public.

The project life is estimated at 10 to 20 years, or longer, depending upon the availability of new geologic data. For example, if the LBNRD was to fly a considerable amount of AEM in the future, that would warrant an update.

- 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 project breakdown by major tasks is provided below in Table 3. The project life is estimated at 20 years and is dependent upon the availability of new geologic data. For example, should the LBNRD choose to fly AEM, an update would be required to incorporate a 3D AEM framework into the Assessment along with the hydrogeologic framework.

The cost is based on labor, travel, printing, and related expenses to assess new geologic data, incorporate previously analyzed geologic data using newer, more effective methods including GIS models, creation of hydrogeologic cross sections, updating existing maps from the 2011 study, meetings, and delivery of final products.

Table 3: Project Cost by Tasks

TASK	COST ESTIMATE
Project Management / Meetings	\$ 13,000
Hydrogeologic Assessment Framework	\$ 80,000
Deliverables / Map Book	\$ 50,000
Total	\$ 143,000

- 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 Assessment will be a critical resource utilized by the staff and Board on a regular basis to manage groundwater resources in a sustainable manner, in collaboration with key stakeholders such as NeDNR, NDEE, and others. Although difficult to actually measure, the primary tangible benefit can be considered sustainable management of groundwater to ensure existing users a long-term supply and maximization of the beneficial use of groundwater. The Assessment provides confidence to decision makers knowing they are relying on the best available scientific data.

Long-term users include communities, industry, commercial, agricultural, and private water consumers. Having a reliable groundwater source will support and help grow the economy. Another major benefit is providing a resource to communities to safeguard existing water supplies from nitrate contamination and to assist other public water systems in planning new wells.

- 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, \$143,000, is shown in Table 4 and will be utilized over a one-year period starting approximately in January 2023 through December 2023. The local share will be provided by LBNRD. There is no acceptable method to calculate cost vs. benefit for a hydrogeologic assessment effort, however, it is generally assumed by staff that having up-to-date, highly visual information is a powerful tool when working with agricultural producers, communities, and the public to management water resources. Maintaining adequate groundwater

supplies is critical to maintain a strong economy and to sustain communities, and life in general.

Once complete, the results from this Assessment will benefit the LBNRD staff and Board with the following:

- Evaluating new well development requests and site new monitoring wells more efficiently,
- Establishing a better understanding of aquifer characteristics such as boundary conditions, potential recharge areas, and aquifer vulnerability based on the most recent information available,
- Completing vulnerability assessments and identify locations in greater need of best management practices,
- Identifying areas for more effective groundwater recharge projects,
- Better define hydrologically connected surface water and groundwater; and;
- Developing conceptual hydrogeologic models that could be used to build numerical groundwater flow models, such as MODFLOW.
- Provide visuals and maps for operator training classes.

Table 4: Project Cost by Tasks

TASK	COST ESTIMATE
Project Management / Meetings	\$ 13,000
Hydrogeologic Assessment Framework	\$ 80,000
Deliverables / Map Book	\$ 50,000
Total	\$ 143,000

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 cost and list of project benefits to help justify economic feasibility are shown above in 3.C. The cost of the next best alternative is to fly the LBNRD with AEM, which based upon similar projects completed in Nebraska, could cost well over \$1,000,000 to collect adequate data. The cost for data assessment, interpolation, mapping, and reporting would add another \$100,000 and \$200,000.

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.

A letter of support and financial assurance has been provided in Attachment A – Letter of Support. In July 2022, the LBNRD Board has budgeted cash to match 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).

There is sufficient annual revenue within the LBNRD's annual budget, specifically property tax revenues obtained by the district allowable through state law. The LBNRD has estimated the 2022-2023 property tax request at 0.021044 cents per \$100 of valuation resulting in \$1,846,600 from property taxes, and a total operating budget of \$4,174,054.

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.).

N/A

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

In 1972, NRDs were granted statutory authority (2-3229) by the Nebraska Legislature to receive local property taxing authority to carry out the development, protection, and management of the resources in their respective areas. Some of the specific purposes granted by law includes:

- Water supply for any beneficial uses
- Development, management, utilization, and conservation of groundwater and surface water

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

The Assessment supports goals, objectives, and action items related to sustainable water management, recognition and identification of connected groundwater and surface water, water quality goals, and others, all within the following local and state plans:

- LBNRD’s Integrated Management Plan (IMP), effective August 2019
- LBNRD’s Master Plan, effective 2019
- LBNRD’s Groundwater Management Plan, effective 2017
- Little Blue River Basin Water Management Plan, Plan Version 2.0, effective May 2016

LBNRD Voluntary Integrated Management Plan – August 2019

Goal #1 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide recommendations on how to improve and expand collection of groundwater levels (*meets Action Item 1.1.1 and 1.1.2*).
- Will provide best available data and science to aid future modeling tools and resolve discrepancies in aquifer mapping between the LBNRD and Tri-Basin NRDs (*meets Action Items 1.2.1, 1.2.2, 1.2.3*)

Goal #2 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide technical information and support future financial assistance request to support efficient best management irrigation practices (*meets Action Item 2.1.1*).
- Will provide scientific information to reaffirm or make changes to groundwater management baseline and triggers and for consideration of allocations to prevent further groundwater declines (*meets Action Item 2.1.2*).
- This project includes collaboration with the NeDNR (*meets action 2.1.4*).
- Supports potential development of additional groundwater recharge projects (*meets Action Items 2.2.3, 2.2.4*).

Goal #3 – “Education efforts to raise the level of awareness about finite, interconnected groundwater and surface water resources”.

- Will provide highly visual and useful information on hydrogeologic resources, vulnerability to contamination, etc. for use in learning opportunities at training events and to inform the public about water resources (*meets Action Items 3.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.2, 3.4.3*)

LBNRD Groundwater Management Plan – 2017

Groundwater Reservoir Life Goal

- Supports projects, programs, and actions to “maintain an adequate supply of acceptable quality and quantity of groundwater to forever fulfill the reasonable groundwater demands within the LBNRD”.
- Will provide best available scientific information to support decisions related to management of groundwater management areas for quality and quantity.

LBNRD Master Plan – 2019

Goal #1 – “Maintain and protect groundwater resources and public water supplies for beneficial uses”.

- Will provide the information necessary for the NRD staff and Board to make wise decisions to ensure supplies are available for beneficial uses.
- Will support decision making when evaluating the feasibility of potential water supply and groundwater recharge projects.
- The Assessment will provide information that will support the objective to strive toward Blue River Compact (Compact) compliance.

Goal #4 – “Promote public education for conservation and natural resources awareness”.

- Will provide maps and visuals to ensure an interactive and user-friendly website.
- The Assessment will support public awareness and education efforts.

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 easement, 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.

In 1972, NRDs were granted statutory authority (2-3229) by the Nebraska Legislature to receive local property taxing authority to carry out the development, protection, and management of the resources in their respective areas. Some of the specific purposes granted by law includes:

- Water supply for any beneficial uses

- Development, management, utilization, and conservation of groundwater and surface water

The LBNRD is technically, and legally capable to undertake the Assessment 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.

Three of the most common threats to drinking water faced by LBNRD are:

- 1) Rising nitrate concentrations in public and private drinking water wells,

- 2) Interference issues from competing high-capacity demands, and
- 3) Groundwater declines.

The LBNRD has been tracking nitrate levels district-wide. Figure 5 displays nitrate results from 2000 to 2022, along with eight existing water quality sub-areas. The Assessment will provide recommendations for improving the continued effort to collect water quality data, specifically nitrates.

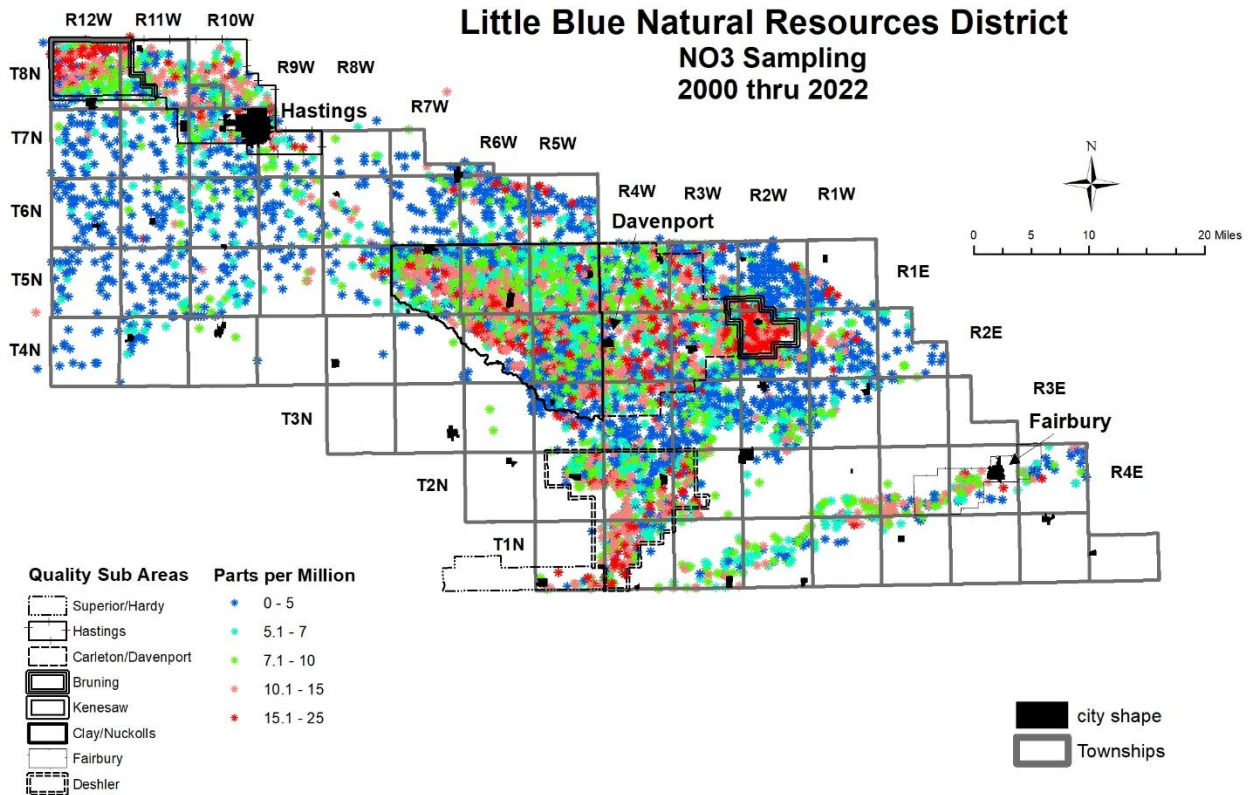


Figure 5 – LBNRD Nitrate Sampling 2000 - 2022

Groundwater declines are significant across most of the LBNRD, as shown in Figure 6. Current rules and regulations implemented by staff and the Board are aimed at ensuring declines do not cause harm to existing operations and users. Groundwater recharge projects have been completed, and are being planned, to infiltrate excessive surface water flows from area streams to the aquifer, a benefit to drinking water systems reliant on the principal aquifer.

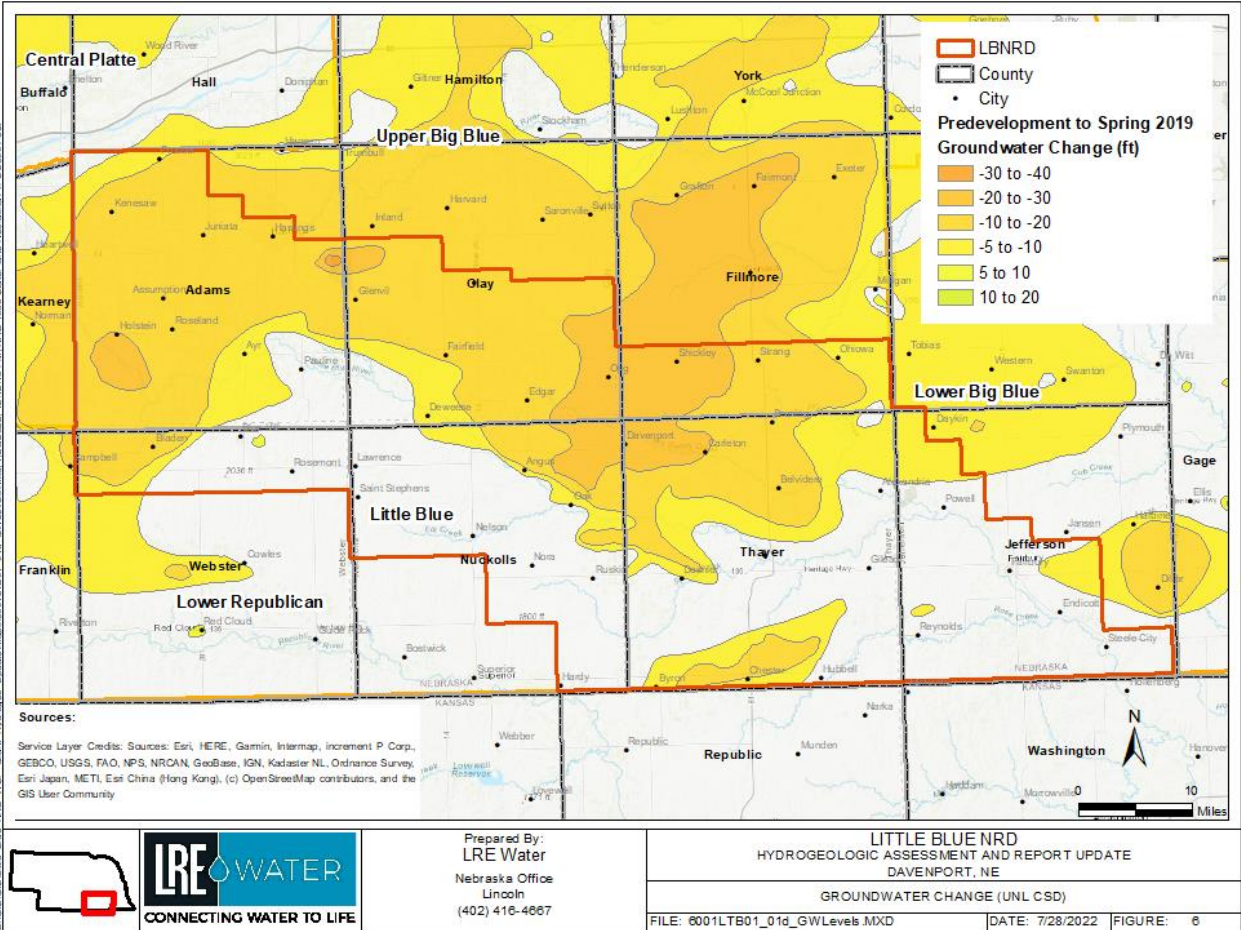


Figure 6 – Groundwater Declines (UNL CSD)

There are approximately 150 public water supply wells in LBNRD serving 42 public water suppliers along with nearly 10,000 private wells. The Assessment will provide information to LBNRD to help water operators and private property owners address these primary issues, which if left unaddressed, could cause public water suppliers to merge and create regionalized systems or to consider expensive nitrate treatment alternatives. A summary of current regional drinking water systems includes:

- Hastings, which is LRE operating a sophisticated system to remove nitrates, is providing water to Trumbull.
- Fairfield will soon be sending water to Edgar due to excessive nitrates.
- Endicott is in the process of planning a system to send water to Steele City due to excessive nitrates.
- Bruning operates a wellfield 8-miles from the community due to high nitrate levels surrounding the original wellfield.
- The Little Blue Valley Water System, a combination of Little Blue NRD’s rural water system and Fairbury, are working together on a proposed wellfield site near Daykin due to nitrates in Fairbury’s existing system (the

supplier to LBNRD’s rural water system). This system will serve rural water customers, Fairbury, Gilead, and Gladstone.

- Prosser, due to very high nitrates, opted to install reverse osmosis systems in every home to treat nitrates.

The Assessment will provide information on the geologic vulnerability in relation to risk. The vulnerability will be categorized as ‘very low, low, medium, high, and very high’ based upon saturated and unsaturated total clay thickness above the aquifer at each well or test hole location. The output will be a map and GIS data, enabling LBNRD staff to educate and share critical information with communities concerned with nitrate contamination and to develop a strategy to either manage the contamination or to plan for a future water supply. This information will also help target best management practices that aim to reduce nitrate infiltration to source water aquifers and groundwater management areas. An example is presented in Figure 7.

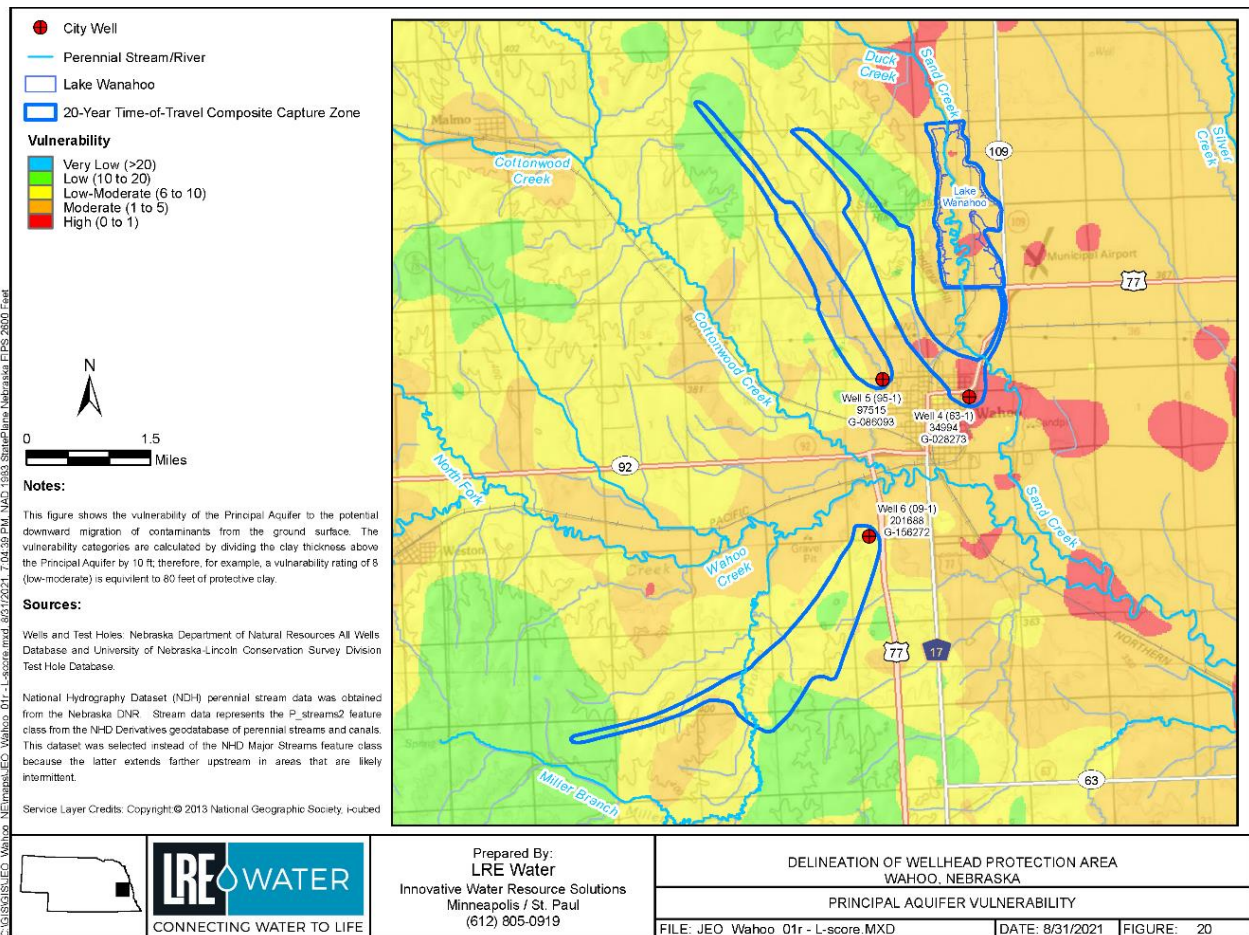


Figure 7 – Example Principal Aquifer Vulnerability Map

The Assessment will aid LBNRD staff in making decisions on well permits, particularly if the proposed high capacity well has the potential to interfere with

existing users. The Assessment will provide an updated Groundwater Resource Development Risk map, also categorized as 'very low, low, medium, high, and very high'. This information enables the LBNRD staff and Board to better communicate with agricultural producers or other high-capacity well users when making decisions on well permits. An example of development risk map is shown in Figure 8.

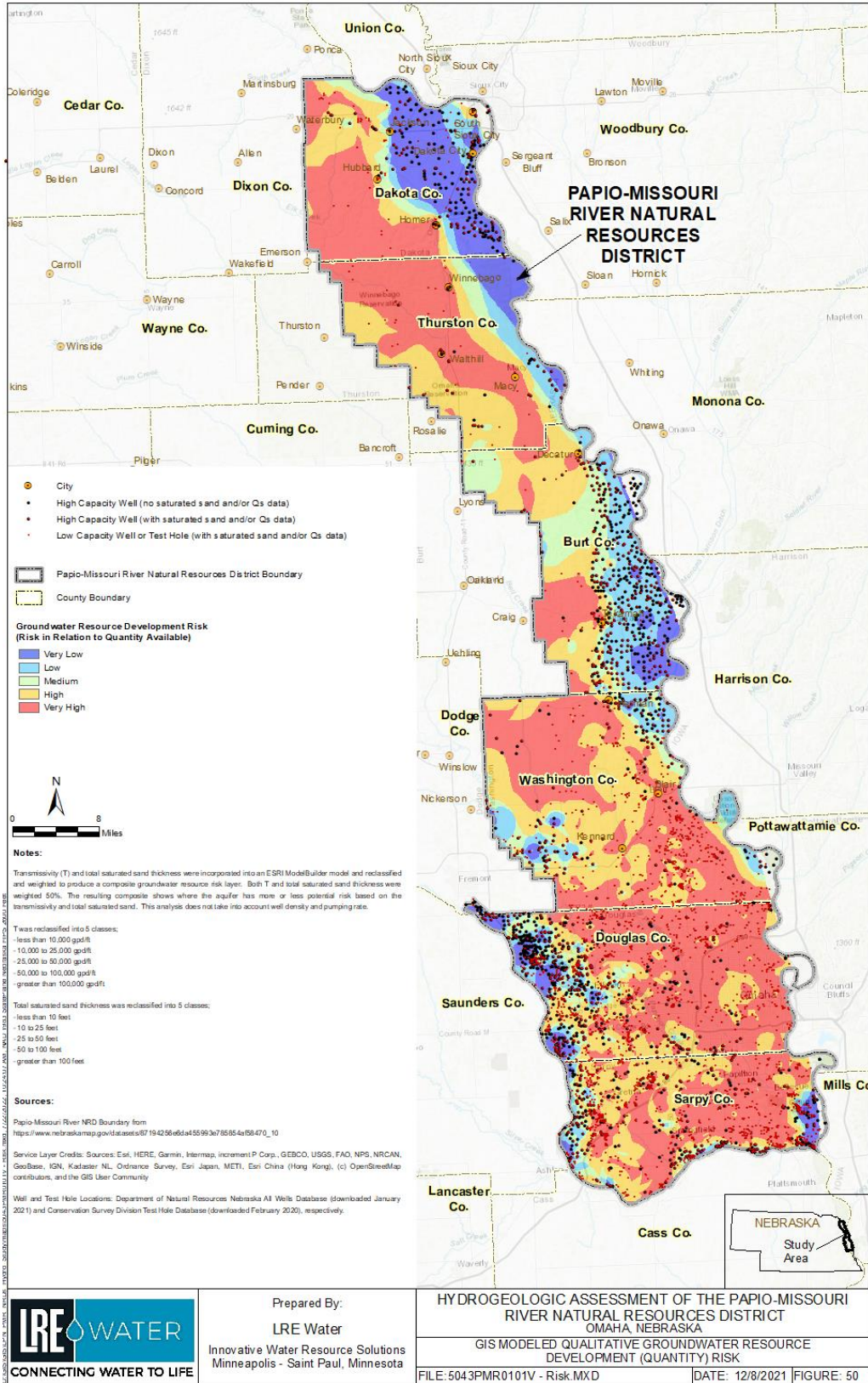


Figure 8 – Example Well Development Risk Map

2. Meets the goals and objectives of an approved integrated management plan or ground water management plan;

- Identify the specific plan that is being referenced including date, who issued it and whether it is an IMP or GW management plan.
- Provide the history of work completed to achieve the goals of this plan.
- List which goals and objectives of the management plan the project provides benefits for and how the project provides those benefits.

The Assessment will provide resources for the LBNRD to meet goals and objectives the Integrated Management Plan (IMP), Groundwater Management Plan (GWMP), and Master Plan. The project area includes the entire LBNRD and a 5-mile buffer (Figure 9).

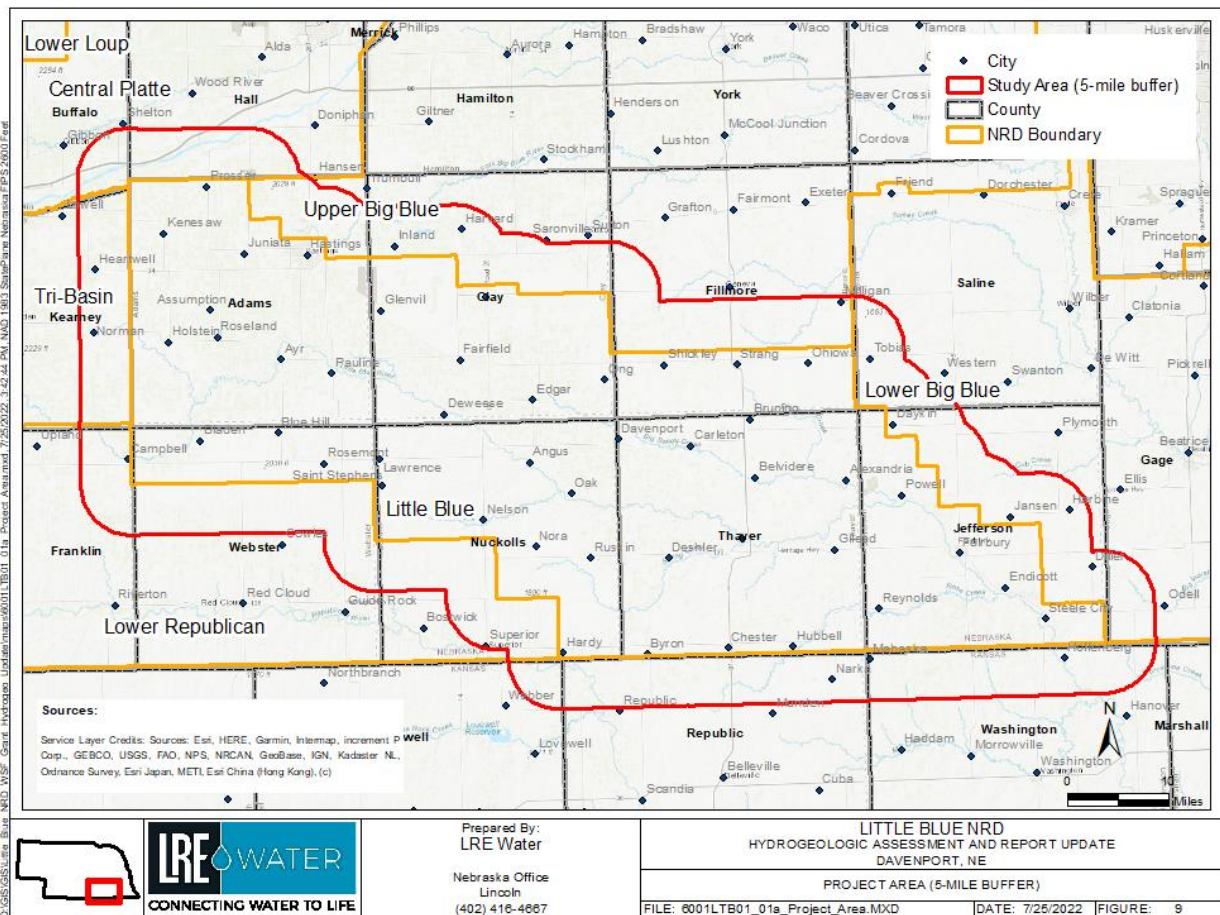


Figure 9 – Project Area

LBNRD Voluntary Integrated Management Plan – August 2019

Goal #1 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide recommendations on how to improve and expand collection of groundwater levels (*meets Action Item 1.1.1 and 1.1.2*).
- Will provide best available data and science to aid future modeling tools and resolve discrepancies in aquifer mapping between the LBNRD and Tri-Basin NRDs (*meets Action Items 1.2.1, 1.2.2, 1.2.3*)

Goal #2 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide technical information and support future financial assistance request to support efficient best management irrigation practices (*meets Action Item 2.1.1*).
- Will provide scientific information to reaffirm or make changes to groundwater management baseline and triggers and for consideration of allocations to prevent further groundwater declines (*meets Action Item 2.1.2*).
- This project includes collaboration with the NeDNR (*meets action 2.1.4*).
- Supports potential development of additional groundwater recharge projects (*meets Action Items 2.2.3, 2.2.4*).

Goal #3 – “Education efforts to raise the level of awareness about finite, interconnected groundwater and surface water resources”.

- Will provide highly visual and useful information on hydrogeologic resources, vulnerability to contamination, etc. for use in learning opportunities at training events and to inform the public about water resources (*meets Action Items 3.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.2, 3.4.3*)

LBNRD Groundwater Management Plan – 2017

Groundwater Reservoir Life Goal

- Supports projects, programs, and actions to “maintain an adequate supply of acceptable quality and quantity of groundwater to forever fulfill the reasonable groundwater demands within the LBNRD”.
- Will provide best available scientific information to support decisions related to management of groundwater management areas for quality and quantity.

LBNRD Master Plan – 2019

Goal #1 – “Maintain and protect groundwater resources and public water supplies for beneficial uses”.

- Will provide the information necessary for the NRD staff and Board to make wise decisions to ensure supplies are available for beneficial uses.

- Will support decision making when evaluating the feasibility of potential water supply and groundwater recharge projects.
- The Assessment will provide information that will support the objective to strive toward Blue River Compact (Compact) compliance.

Goal #4 – “Promote public education for conservation and natural resources awareness”.

- Will provide maps and visuals to ensure an interactive and user-friendly website.
 - The Assessment will support public awareness and education efforts.
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.

Successful projects aimed at recharging a depleted aquifer must be based on a strong scientific foundation, as was the case in 2014 when LBNRD began work to plan and design groundwater recharge projects. Five projects were ultimately constructed, all of which utilized WSF funding. Construction on these projects were completed in 2019. Site selection was aided by a ‘Potential Artificial Recharge Area’ figure created from the information in the GIS database that supported the 2011 Study (Figure 10).

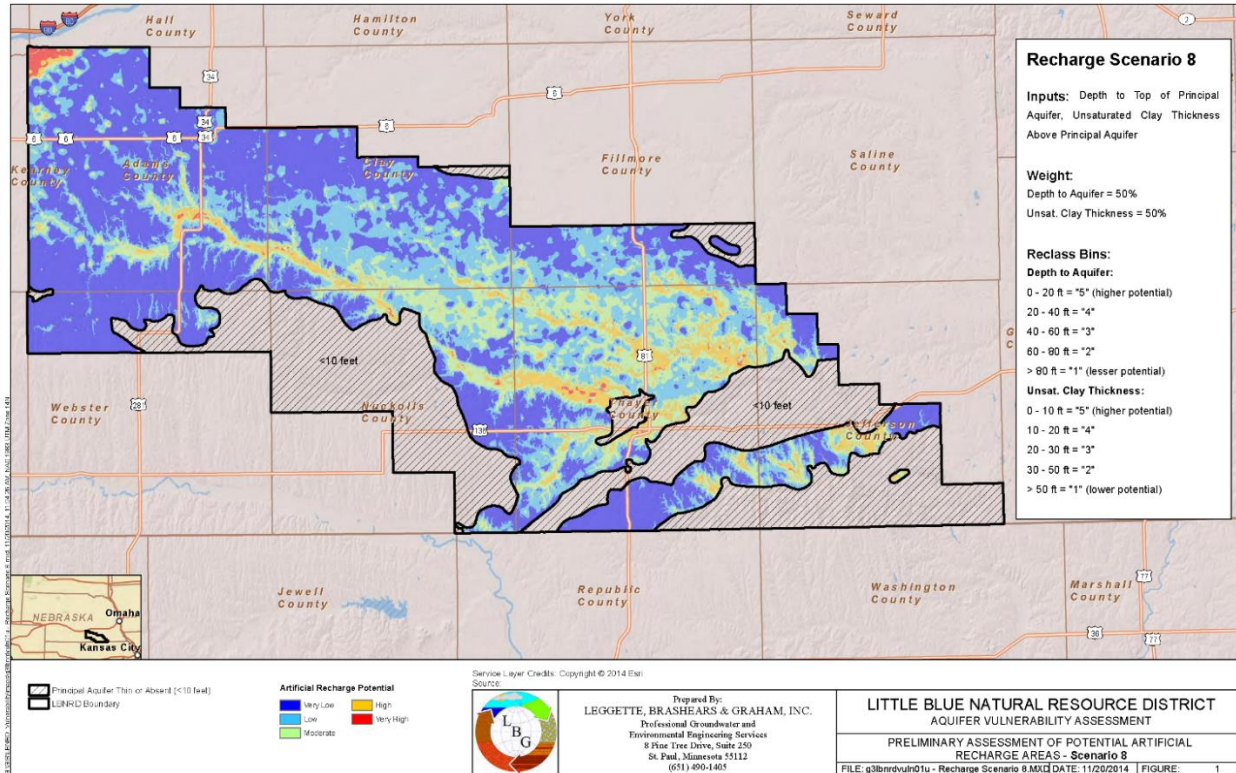


Figure 10 – Artificial Recharge Potential (2014)

The LBNRD intends to locate and construct groundwater recharge projects in the future and will rely on an updated Potential Artificial Recharge Area map as part of this Assessment. The target locations will be based upon locations that provide excessive surface water runoff, so this water can recharge depleted aquifers that support the agricultural economy.

Aquifer depletions are currently being managed through the LBNRD’s rules and regulations which are in part based upon the information provided in the 2011 Study, which will be updated as part of this project. A summary of how the LBNRD has used this information includes:

- Irrigation well spacing in the LBNRD is set at 1,000 feet, within the Very High Risk area spacing is 1,250 feet, more stringent than state setbacks.
- There is only one high capacity well allowed per 80 acres in the Very High Risk area.
- New well permits are ranked using the Transmissivity, Specific Yield, Saturated Sand, and using water level data from 2000-2007, and review of the potential for Recharge maps.
- A minimum value of 100 must be met, if not then the producer is allowed to drill, and test pump the well in a time frame of August 1st through September 31st.

- The test well must produce 400 gpm as an instant and cumulative flow or permit will not be signed and well must be abandoned.
 - There is a permanent stay in the area noted as “Aquifer Less Than 10 Feet Thick”. In the past, some high-capacity wells were being installed in limestone and/or sandstone formations in this area, in some cases historically causing a negative impact to domestic or other high-capacity wells.
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 Assessment will directly contribute to multiple water supply goals and will serve as a key tool for the staff and Board to make confident decisions on water management. The LBNRD will utilize the Assessment to fulfill its legislative purposes and support daily operational goals. Once complete, the results from this Assessment could be used to assist LBNRD staff with the following:

- Provide visuals and maps for operator training classes.
- Evaluating new well development requests and site new monitoring wells more efficiently.
- Establishing a better understanding of aquifer characteristics such as boundary conditions, potential recharge areas, and aquifer vulnerability based on the most recent information available.
- Completing vulnerability assessments and identify locations in greater need of best management practices.
- Identifying areas for more effective groundwater recharge projects,
- Better define hydrologically connected surface water and groundwater.
- Support community efforts to protect water supplies.
- Developing conceptual hydrogeologic models that could be used to build numerical groundwater flow models, such as MODFLOW.

The Assessment will provide resources for the LBNRD to meet goals and objectives of both the IMP and GWMP as described below:

[Little Blue NRD Voluntary Integrated Management Plan – August 2019](#)

Goal #1 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide recommendations on how to improve and expand collection of groundwater levels (*meets Action Item 1.1.1 and 1.1.2*).
- Will provide best available data and science to aid future modeling tools and resolve discrepancies in aquifer mapping between the LBNRD and Tri-Basin NRDs (*meets Action Items 1.2.1, 1.2.2, 1.2.3*)

Goal #2 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide technical information and support future financial assistance request to support efficient best management irrigation practices (*meets Action Item 2.1.1*).
- Will provide scientific information to reaffirm or make changes to groundwater management baseline and triggers and for consideration of allocations to prevent further groundwater declines (*meets Action Item 2.1.2*).
- This project includes collaboration with the NeDNR (*meets action 2.1.4*).
- Supports potential development of additional groundwater recharge projects (*meets Action Items 2.2.3, 2.2.4*).

Goal #3 – “Education efforts to raise the level of awareness about finite, interconnected groundwater and surface water resources”.

- Will provide highly visual and useful information on hydrogeologic resources, vulnerability to contamination, etc. for use in learning opportunities at training events and to inform the public about water resources (*meets Action Items 3.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.2, 3.4.3*)

Little Blue NRD Groundwater Management Plan – 2017

Groundwater Reservoir Life Goal

- Supports projects, programs, and actions to “maintain an adequate supply of acceptable quality and quantity of groundwater to forever fulfill the reasonable groundwater demands within the LBNRD”.
- Will provide best available scientific information to support decisions related to management of groundwater management areas for quality and quantity.

While the 2011 Study remains useful, over 6,000 additional data points are readily available to be incorporated into the GIS used to produce information. The updated Assessment will provide a long-term scientific resource for staff for decades and will increase the hydrogeologic cross sections from 5 to 20 or 25 district-wide.

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 Ogallala Aquifer is the single most important water source in the Great Plains and is critical to the state's economy. The Aquifer provides sufficient groundwater for irrigation and domestic water supply, two primary beneficial uses, but if mismanaged, could be overused, causing significant groundwater declines. The NRDs have been assigned to manage 'water supply for any beneficial uses'. This project provides the tools to fulfill this statutory obligation in an efficient manner.

The LBNRD is strongly committed to working with rural residential, agricultural producers, commercial, and industrial users and proposed development to help ensure they maintain a sustainable water supply. The Assessment improves how the LBNRD staff and Board can work directly, one-on-one, with property owners and residents, agricultural producers, developers, municipalities, and industries.

6. Is cost-effective;

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

The total project cost by major task is listed in Table 5. The project will be implemented by a contactor that specializes in hydrogeologic evaluation using a proven technique from four other recent projects completed for Lower Elkhorn, Lower Platte North, Papio-Missouri River, and Nemaha, and an existing effort ongoing for Lower Platte South NRDs. The overall approach to building the Assessment is shown in Figure 11.

Table 5: Project Cost by Tasks

TASK	COST ESTIMATE
Project Management / Meetings	\$ 13,000
Hydrogeologic Assessment Framework	\$ 80,000
Deliverables / Map Book	\$ 50,000
Total	\$ 143,000

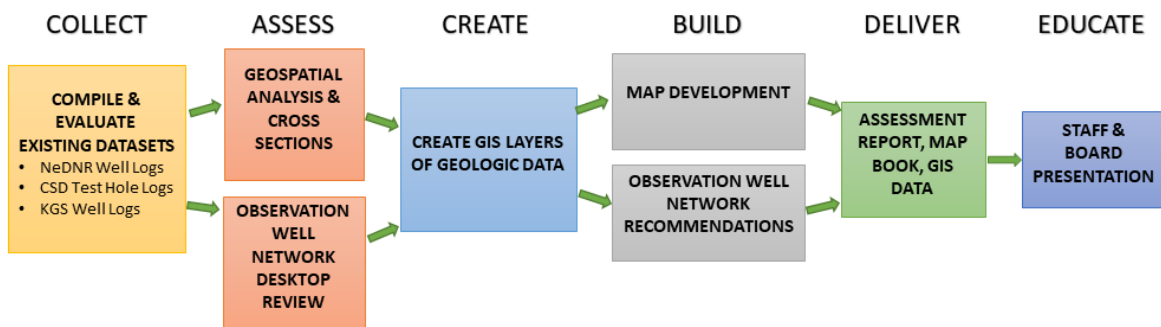


Figure 11 – Assessment Development General Approach

Using a similar approach builds consistency on how geologic data is represented between NRDs. The method has been reviewed and accepted in the past by NeDNR and NDEE staff. The approach has also been peer reviewed by the UNL CSD staff in the past.

Another method that would yield similar benefits is obtaining AEM data. Thus far, the LBNRD has not flown AEM. To obtain AEM and create a 3D AEM framework, to compliment the hydrogeologic framework, could cost more than \$1,000,000. Therefore, the LBNRD staff and Board have determined that updating the 2011 Study, using readily available geologic data from NeDNR, UNL CSD, and KGS, is the most cost-effective approach. Furthermore, completion of a full-scale hydrogeologic framework, a major component of the Assessment, is a key first step any entity with interest in building a groundwater flow model.

- 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 Blue River Basin Compact (Compact) includes the States of Kansas and Nebraska and was ratified on January 25, 1971, to management flows and water quality of the Blue River, which flows generally from south-central Nebraska south to near Manhattan, KS. The Blue River Watershed, in relation to the LBNRD, is shown in Figure 12.

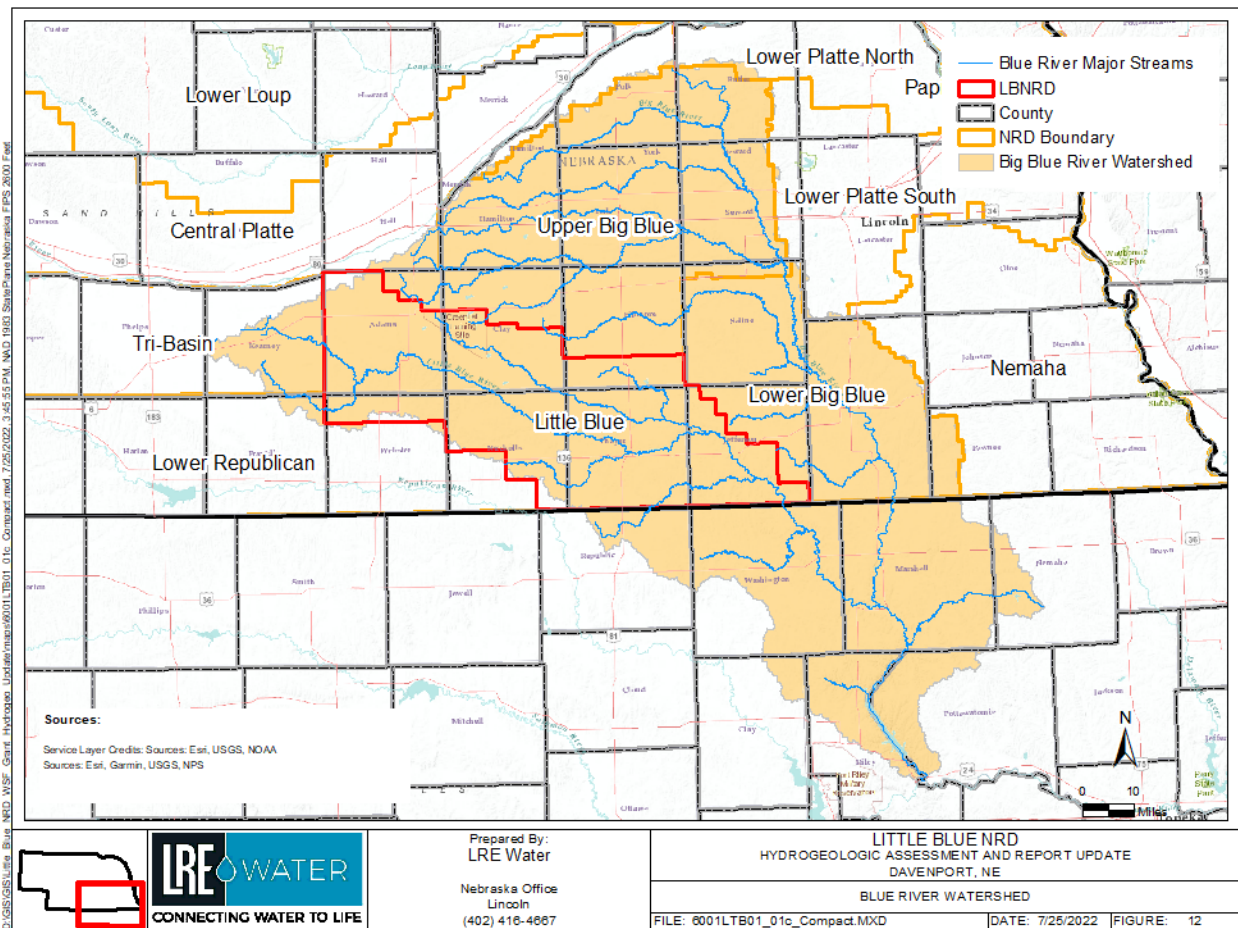


Figure 12 – Blue River Basin Watershed

The LBNRD is required to meet annually with all stakeholders to report water saving efforts regarding both groundwater and surface water. The staff works collaboratively with the NeDNR, Upper Big Blue, Tri-Basin and Lower Big Blue NRD's to ensure compact requirements with the State of Kansas are met and have

invested a considerable amount of money towards a water flow model to assist with future water management decisions.

The Assessment will enhance capabilities to manage water resources and aid in the collaborative effort with the NRDs and State of Kansas to remain in compliance with the Compact. The project will promote water conservation, groundwater recharge, and provide a basis of rules and regulations, all intended to maintain an adequate supply of acceptable quality and quantity of groundwater. Increased groundwater levels will support increases of discharge and baseflow to streams, thus helping the State of Nebraska support the Compact.

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.

According to UNL, agriculture is a critical component of Nebraska's economy, accounting for nearly 34% of business sales and nearly a quarter of all jobs. Irrigation, mostly of which is sourced from groundwater, is critical to maintain a strong agricultural economy. Mismanagement of groundwater resources can lead to regulations on groundwater pumping, limiting the ability of private property owners' to beneficially use the groundwater resources beneath their property.

Groundwater declines are a threat to how property can be utilized for the benefit of the owner and the State's economy. Sound water management, driven by the LBNRD, requires the use of the best available science, in this case geologic data, ensuring a sustainable water supply for municipalities, thousands of private well owners, agricultural users, and commercial and industrial concerns.

While it is challenging to estimate a value of cost savings, it is known that groundwater declines equate to deeper wells, thus increasing cost of pumping and well construction. Also, regulations to limit pumping would reduce economic incomes for agricultural producers, which then trickles to the hundreds of supporting businesses in the area. There has not been an economic analysis to estimate the value, but it could be assumed to be several million in potential losses. The Assessment helps support decisions to avoid these types of losses.

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 primary water quality issue is rising nitrate concentrations in aquifers that supply public and private drinking water. The LBNRD has 38 communities and a population of nearly 50,000, all of whom will benefit from the Assessment.

Historically, the LBNRD has been proactive working with communities on wellhead protection plans and mapping. Planning is a key first step to evaluate the level of threat from potential contaminants and to educate the public. With the information from the Assessment, the LBNRD will be prepared to assist communities as requests are made for assistance. The following communities have mapping and plans supported by LBNRD: Blue Hill, Byron, Carleton, Chester, Clay Center, Davenport, Edgar, Endicott, Fairbury, Fairfield, Glenvil, Hastings, Hebron, Holstein, Hubbell, Juniata, Kenesaw, Lawrence, Nelson, Ohioa, Ong, Prosser, Ruskin, Roseland, Shickely, and Steele City. Those with just maps delineated by NDEE, but no plan are: Alexandria, Belvidere, Bladen, Bruning, Deshler, DeWeese, Reynolds.

Based upon the State Drinking Water Information System database, 25 of 33 public water systems in the LBNRD reporting nitrate data to the state had at least one well within their system report over 5 parts per million (ppm) since 2015. More concerning, 16 of 33 had at least one result greater than 7 ppm and 8 of 33 had at least one result greater than 10 ppm (the Maximum Contaminant Level is 10 ppm).

One of the immediate solutions is to site a new well in a location with a plentiful water supply along with low nitrate concentrations. Low nitrate areas exist and are often found by evaluating clay thickness, a natural barrier for nitrate contamination, above the Principal Aquifer. The hydrogeologic cross sections will aid communities in working with engineers and geologist to site locations for new wells. An example of a hydrogeologic cross section used to locate a new water source in northeast Nebraska is shown in Figure 13.

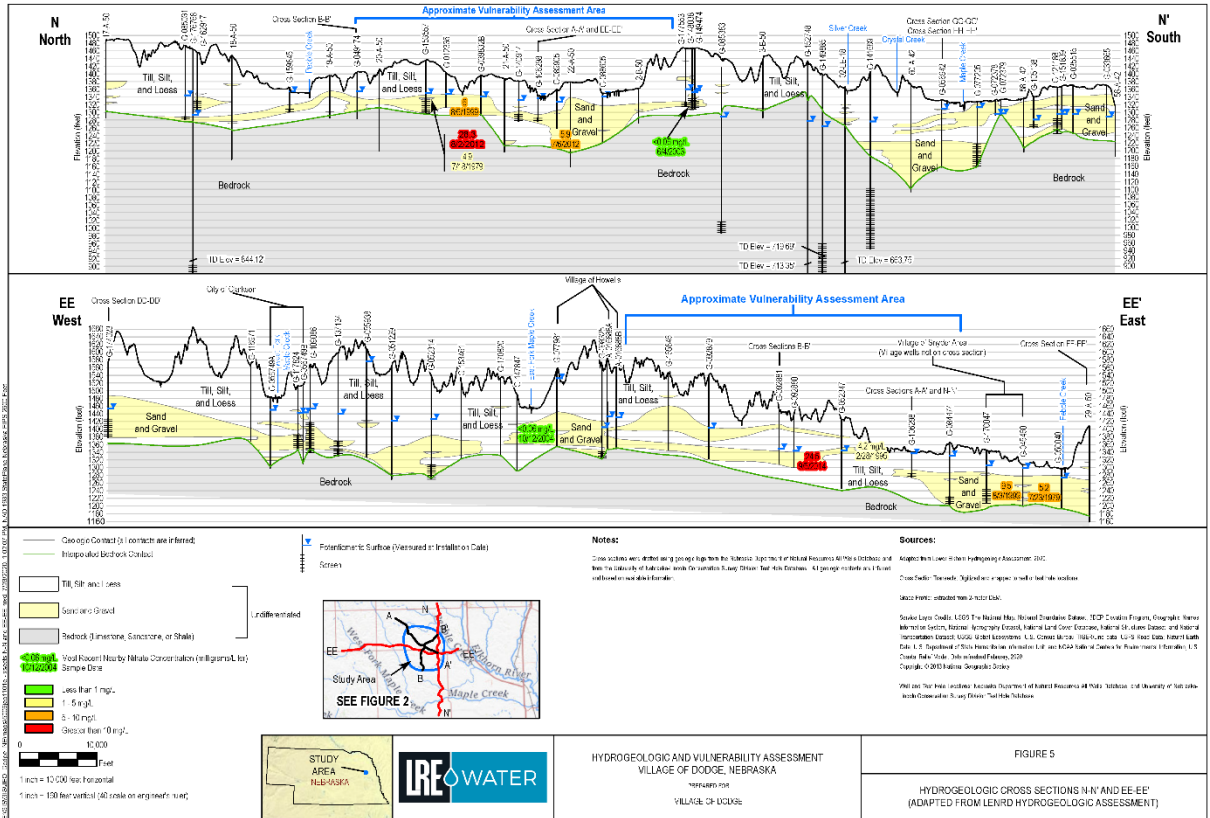


Figure 13 – Example Cross Section for Siting New Water Sources

The Assessment, specifically the Groundwater Resource Geologic Vulnerability Map, will also provide information on areas on the surface that are most vulnerable, and therefore most critical to place conservation and nutrient reducing management practices. The vulnerability map also serves as an aid for siting new wells. An example of a vulnerability assessment map is shown in Figure 14. This project will create a district-wide vulnerability assessment map and associated GIS files.

The LBNRD has been tracking nitrate levels district-wide. Figure 15 displays nitrate results from 2000 to 2022, along with eight existing water quality sub-areas. The Assessment will provide recommendations for improving the continued effort to collect water quality data, specifically nitrates.

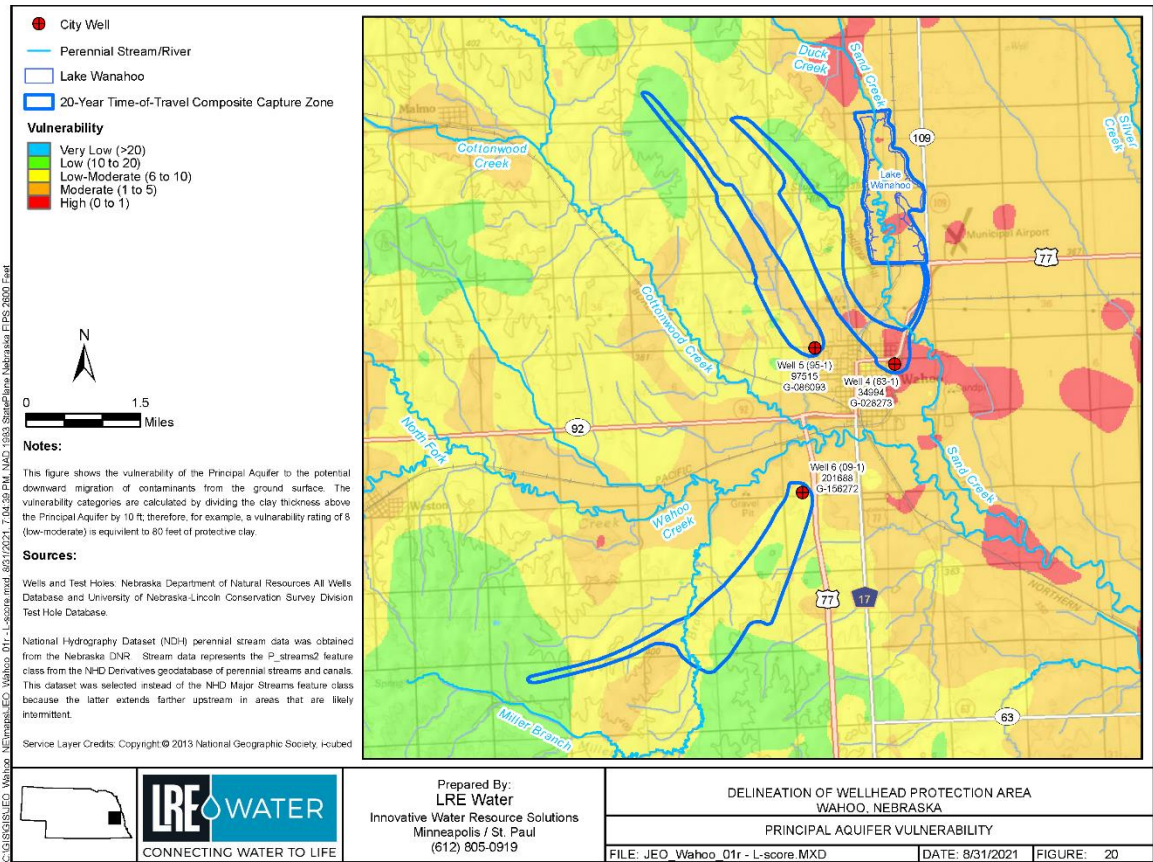


Figure 14 – Example Principal Aquifer Vulnerability Map

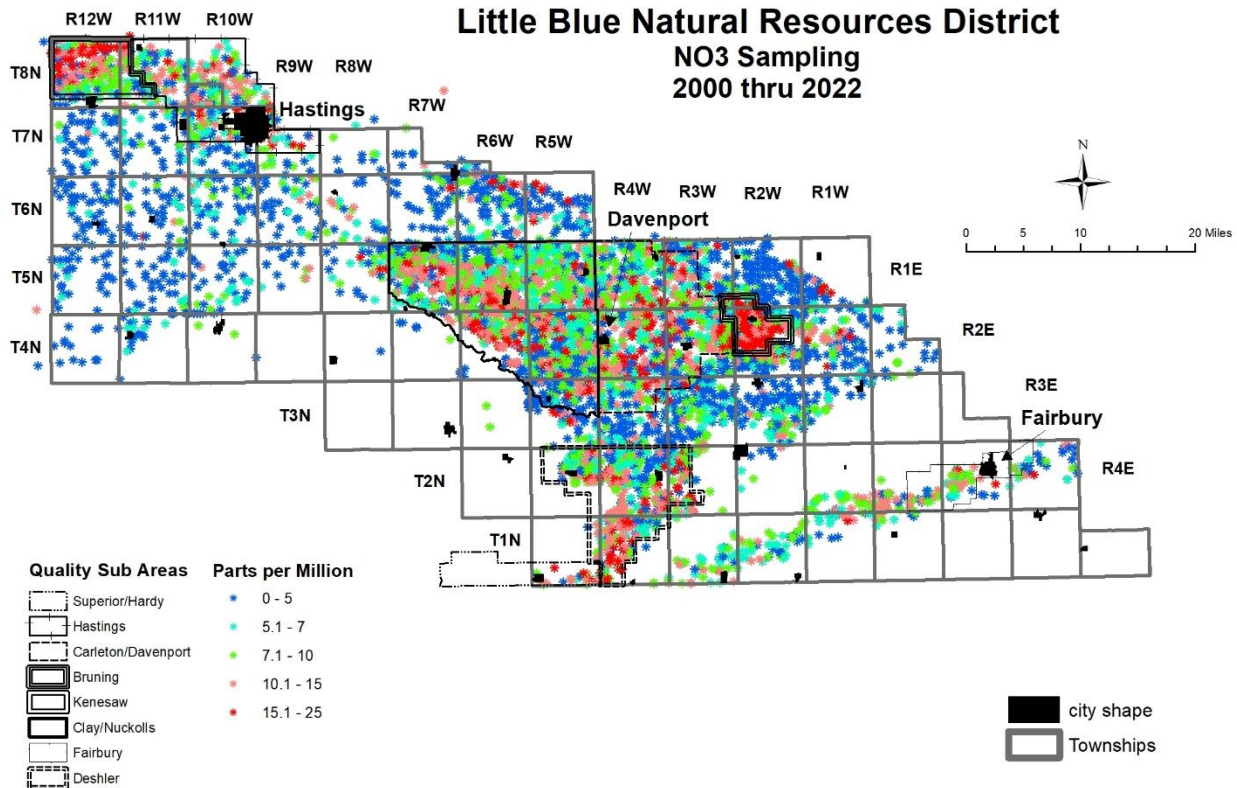


Figure 15 – LBNRD Nitrate Sampling 2000 – 2022

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 LBNRD is the local jurisdiction providing cash match to develop the Assessment in collaboration with the NeDNR. There is sufficient annual revenue within the LBNRD’s annual budget, specifically property tax revenues obtained by the district allowable through state law. The LBNRD has estimated the 2022-2023 property tax request at 0.021044 cents per \$100 of valuation resulting in \$1,846,600 from property taxes, and a total operating budget of \$4,174,054

In July 2022, the LBNRD Board placed \$57,200 in the budget in anticipation of working on the Assessment in 2023 in collaboration with the NeDNR and utilizing funding from the NRC WSF. There are currently no other funding sources beyond WSF and LBNRD.

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.

Currently, the 2011 Study has been used by staff to share the hydrogeologic cross sections and maps for presentation purposes at operator training classes held during the winter months. These visuals have helped the public understand the characteristics of the district's aquifer. The 2011 Study is available on LBNRD's website and is regularly viewed as the staff frequently fields questions from well drillers and general public.

Stakeholders that will benefit from this project include agricultural producers, communities and public water suppliers, well drillers, NeDNR, NDEE, neighboring NRDs, Compact stakeholders, the public, Rainwater Basin Joint Venture, among others.

LBNRD's voluntary IMP, GWMP, and Master Plan all outline goals, objectives, and action items that will be supported by the Assessment. Specific goals addressed by the project include:

The Assessment will provide resources for the LBNRD to meet goals and objectives the IMP, GWMP, and Master Plan as described below:

LBNRD Voluntary Integrated Management Plan – August 2019

Goal #1 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide recommendations on how to improve and expand collection of groundwater levels (*meets Action Item 1.1.1 and 1.1.2*).
- Will provide best available data and science to aid future modeling tools and resolve discrepancies in aquifer mapping between the LBNRD and Tri-Basin NRDs (*meets Action Items 1.2.1, 1.2.2, 1.2.3*)

Goal #2 – “Better and more scientific data and methods to support wise management of interconnected groundwater and surface water”.

- Will provide technical information and support future financial assistance request to support efficient best management irrigation practices (*meets Action Item 2.1.1*).
- Will provide scientific information to reaffirm or make changes to groundwater management baseline and triggers and for consideration of allocations to prevent further groundwater declines (*meets Action Item 2.1.2*).
- This project includes collaboration with the NeDNR (*meets action 2.1.4*).
- Supports potential development of additional groundwater recharge projects (*meets Action Items 2.2.3, 2.2.4*).

Goal #3 – “Education efforts to raise the level of awareness about finite, interconnected groundwater and surface water resources”.

- Will provide highly visual and useful information on hydrogeologic resources, vulnerability to contamination, etc. for use in learning opportunities at training events and to inform the public about water resources (*meets Action Items 3.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.2, 3.4.3*)

LBNRD Groundwater Management Plan – 2017

Groundwater Reservoir Life Goal

- Supports projects, programs, and actions to “maintain an adequate supply of acceptable quality and quantity of groundwater to forever fulfill the reasonable groundwater demands within the LBNRD”.
- Will provide best available scientific information to support decisions related to management of groundwater management areas for quality and quantity.

LBNRD Master Plan – 2019

Goal #1 – “Maintain and protect groundwater resources and public water supplies for beneficial uses”.

- Will provide the information necessary for the NRD staff and Board to make wise decisions to ensure supplies are available for beneficial uses.
- Will support decision making when evaluating the feasibility of potential water supply and groundwater recharge projects.
- The Assessment will provide information that will support the objective to strive toward Blue River Compact (Compact) compliance.

Goal #4 – “Promote public education for conservation and natural resources awareness”.

- Will provide maps and visuals to ensure an interactive and user-friendly website.
- The Assessment will support public awareness and education efforts.

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 LBNRD covers over 1.5 million acres, includes 38 communities, and approximately 33 public water systems, most have state documented concerns with nitrate contamination.

Over the last couple of years, the University of Nebraska Medical Center has been working with NDEE to provide awareness of a growing concern with the link between nitrate contamination to health concerns, specifically methemoglobinemia, colorectal cancer, thyroid disease, neural tube defects, and pediatric cancers (Presentation by Jesse E. Bell, PhD; Health Concerns with Nitrates in Drinking Water, May 2019). The UNMC has identified public health solutions as: educating the public, enhancing monitoring, contributing to the public dialogue, and research. The Assessment will directly aid efforts to educate the public and enhancing monitoring.

Nitrate contamination is a statewide issue, as contaminants flow beyond any political boundary. The LBNRD has been tracking nitrate levels. Figure 16 displays nitrate results from 2000 to 2022, along with five existing water quality sub-areas. The Assessment will include a desktop review of the district's 65 observation wells that have dedicated data loggers. These wells are used for monitoring groundwater quality and quantity throughout the district. The purpose of this review will be to evaluate this monitoring well network and make recommendations for continued monitoring and also modifications to the network to improve groundwater quantity and groundwater quality evaluations, and to support future decision making. This will include a review of each well's location, depth, screening interval, and lithology, and the potential influence from surrounding irrigation wells. If nitrate data are available, historical concentrations will also be plotted with the hydrograph for each well.

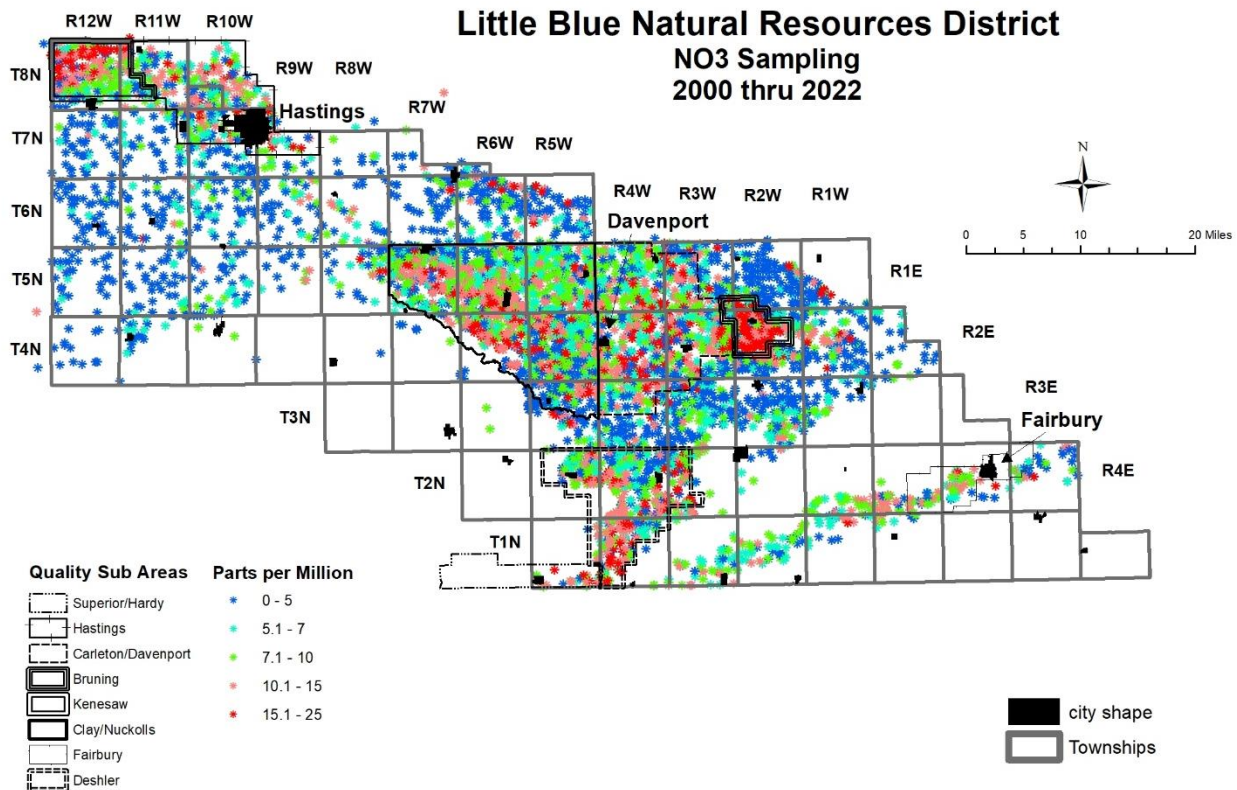


Figure 16 – LBNRD Nitrate Sampling 2000 - 2022

The Assessment provides a variety of highly visual, easy to understand figures to aid in education of the public and community leaders on the level of risk and areas that are most vulnerable to nitrate contamination. The LBNRD will leverage the Assessment to aid in management decisions that will reduce the risk of nitrates causing health issues within their NRD and beyond.

The benefit to the state is the availability of hydrogeologic data, an understanding of high-risk areas, and ability to disseminate information to the public and other water users within the LBNRD. Specifically, NDEE will be able to utilize the information from the Assessment when helping communities face issues with nitrate contamination. The NeDNR staff can utilize information to help support IMP plans, programs, and actions; as well as ensuring compliance with the Blue River Compact.

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 project will leverage local sources of funding allocated for natural resources management with the State’s NRC WSF. The cost of the entire project is \$143,000 (Table 6). The LBNRD has approved the local cost share match as part of the FY2022/2023 budget. There are no other sources of funding applied to the project. A letter of support and financial assurance has been provided in Attachment A – Letter of Support. In July 2022, the LBNRD Board has budgeted cash to match the project. Should the WSF not be obtained, the LBNRD would try again in 2023 for WSF or consider other funding options.

Table 6: Project Task and Funding Summary

TASK	COST ESTIMATE	WSF Grant Request	Local Cost Share
		60%	40%
Project Management / Meetings	\$ 13,000	\$ 7,800	\$ 5,200
Hydrogeologic Assessment Framework	\$ 80,000	\$ 48,000	\$ 32,000
Deliverables / Map Book	\$ 50,000	\$ 30,000	\$ 20,000
Total	\$ 143,000	\$ 85,800	\$ 57,200

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.

A plentiful, safe, and sustainable groundwater supply is a critical function of a healthy watershed, particularly in an area so dependent upon the Principal Aquifer for drinking water and irrigation. Furthermore, water resources in the LBNRD are hydrologically connected in many areas. Decisions related to groundwater management can affect surface water flow, and vice versa.

In 2019, the LBNRD completed five groundwater recharge projects, each contributing to the sustainability of the groundwater supply and watershed health and function. These projects, including three in-stream weirs, one floodplain wetland restoration, and one 2-mile-long relic oxbow reconnection, provide secondary benefits such as improved fish and wildlife habitat, reconnection of the natural floodplain to streams, water filtration, and other basis functions of a health watershed.

The project locations were identified by a feasibility study and review of a map created from the 2011 Study that helped determine the most beneficial sites for artificial groundwater recharge. The input metrics includes depth to top of Principle Aquifer and unsaturated clay thickness above principal aquifer. Using GIS, a map was created that displays ‘very-low, low, moderate, high, and very high’ artificial recharge potential (Figure 17). The updated Assessment will incorporate this map and be used in the future to location similar projects, thus contributing to the health and function of the Little Blue River watershed.

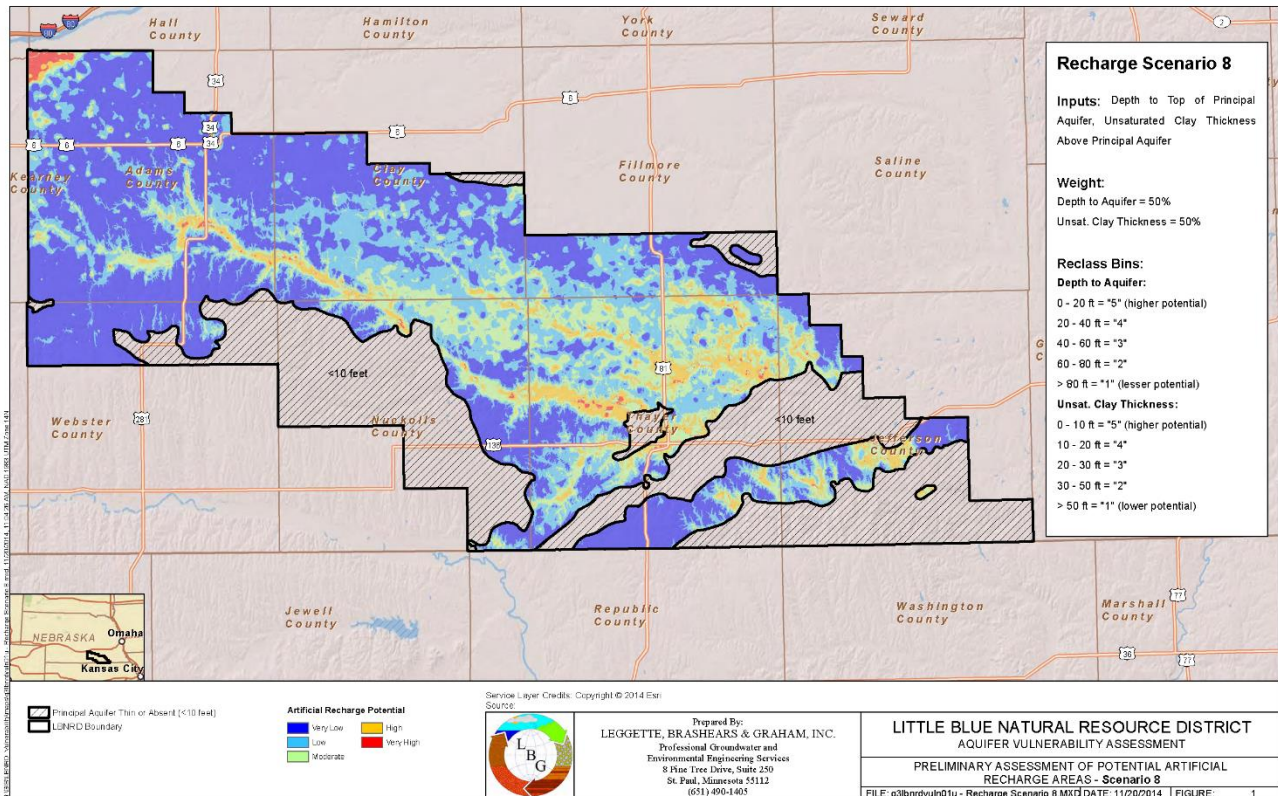


Figure 17 – Artificial Recharge Potential (2014)

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 latest version of the NeDNR Annual Report and Plan of Work for the State Water Planning and Review Process is dated September 2020. The Assessment

project will provide NeDNR a valuable resource working with programs and to implement the state water planning and review process, including:

Objective #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”.

- The primary purpose of the Assessment is to provide data, information, and strengthen capabilities to make key management decisions and support water resources planning (i.e wellhead protection, recharge projects, etc.).

Objective #2 – “Provide staff and resources to support planning and implementation of water resources projects”.

- NeDNR staff will be directly involved in the development of the Assessment, provide buy-off of the deliverable, and have the Assessment available to them as a tool to support planning and implementation of water resources projects.

Objective #3 – “Support locally developed water management plans for conjunctively managing hydrologically connected groundwater and surface water supplies”.

- Establishing a better understanding of aquifer characteristics such as boundary conditions and potential recharge areas based on the most recent information available.
- The Assessment will help better define hydrologically connected surface water and groundwater.
- Serve as a foundation for developing conceptual hydrogeologic models that could be used to build numerical groundwater flow models, such as MODFLOW.

Objective #4 – “Provide resources to map and identify areas vulnerable to flood damage”

- Not applicable to this project.

Objective #5 – “Participate in interagency collaboration with federal agencies, state agencies, local NRDs, and other water interest entities on various water resources programs and projects”.

- The LBNRD interacts with NeDNR staff on a weekly basis involving various programs and regulations.
- The information made available as part of the Assessment will be available to multiple entities such as NeDNR, USGS, UNL CSD, neighboring NRDs, Rainwater Basin Joint Venture, among others.
- NeDNR will be a partner on the project and have an opportunity to track progress and provide feedback.

Objective #6 – “Consolidate and present information in a form that is understandable and useful to the public and interagency collaborators”.

- A major benefit of the Assessment is the ability to present highly graphic figures and maps as tools for public education.
- The LBNRD has used cross sections and maps for presentation purposes during development of the IMP. Information from the Assessment has been, and will be, shared with the public, in collaboration with NeDNR, at future meetings.

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.

N/A