+NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Lake Babcock Capacity Study for Multiple Beneficial Use

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

Sponsor Business Name: Loup Power District

Sponsor Contact's Name: Neal Seuss

Sponsor Contact's Address: 2404 15th Street, Columbus Nebraska 68601

Sponsor Contact's Phone: (402) 564-3171

Sponsor Contact's Email: nsuess@loup.com

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

   Grant amount requested. $ 75,000

   - 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. NA
- What is the population served by your project? NA
- Provide a demonstration of need. NA
- **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☐

4. **Partnerships**

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

The Loup Power District (LPD) is the Project Sponsor for the Lake Babcock Capacity Study for Multiple Beneficial Use (the Study). During the study phase, LPD will coordinate and work closely with the Nebraska Department of Natural Resources (NeDNR).

LPD has letters of support from Nebraska Game and Parks Commission, Lower Loup Natural Resources District, City of Columbus, Boy Scouts of America, and the Girls Scouts of America. These letters are provided in Appendix A.

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

Loup Power District
The LPD is the lead partner and funding authority for the planning study. They will work and coordinate with the stakeholder's organizations and the public that may be affected by the recommendations contained within the study. A consultant will be hired for this study. LPD will work with the NeDNR on the implementation of the study, grant management, and technical and procedural reviews.

NeDNR
NeDNR will serve as the lead funding and technical agency for the Study. As the grant administrator, NeDNR will have an important role in the Study, in particular, the coordination between LPD and NeDNR.

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.

Table 1 Project Tasks and Costs

Tasks	Cost Estimate	WSF Grant Request 60%	LPD Cost Share 40%
Hydrographic Survey and Physical/Chemical Testing	$32,500	$19,500	$13,000
Conceptual Design Report including locating sites for sediment disposal	$52,250	$31,350	$20,900
Preliminary Engineers Opinion of Cost	$21,500	$12,900	$8,600
Project Management	$18,750	$11,250	$7,500
Total	$125,000	$75,000	$50,000

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!

The project is the Lake Babcock Capacity Study for Multiple Beneficial Use. Lake Babcock, located in Platte County near the City of Columbus, Nebraska, is a hydropower forebay to the Loup Power Canal Powerhouse. The forebay is a regulating reservoir that temporarily stores water for hydroelectric power production. As a green energy source, the Loup Power District (LPD) has over 21,000 service connections plus wholesale customers in a four county area serving a population of approximately 42,000 people.

Figure: Lake Babcock

Over the past 90 years, primarily silt/sand sediment has been deposited into Lake Babcock from the Loup River through the Loup Canal System. LPD is requesting cost share assistance from the Water Sustainability Fund for a feasibility study to

determine how the sediment is being deposited into the lake, the existing and potential storage capacity of the lake, and actions the LPD can do to eliminate sedimentation from reoccurring in the future. In addition, LPD will research the most cost-effective way to remove the buildup of sediment from the lake, thereby improving production and increasing the drought resiliency of this green hydroelectric power system.

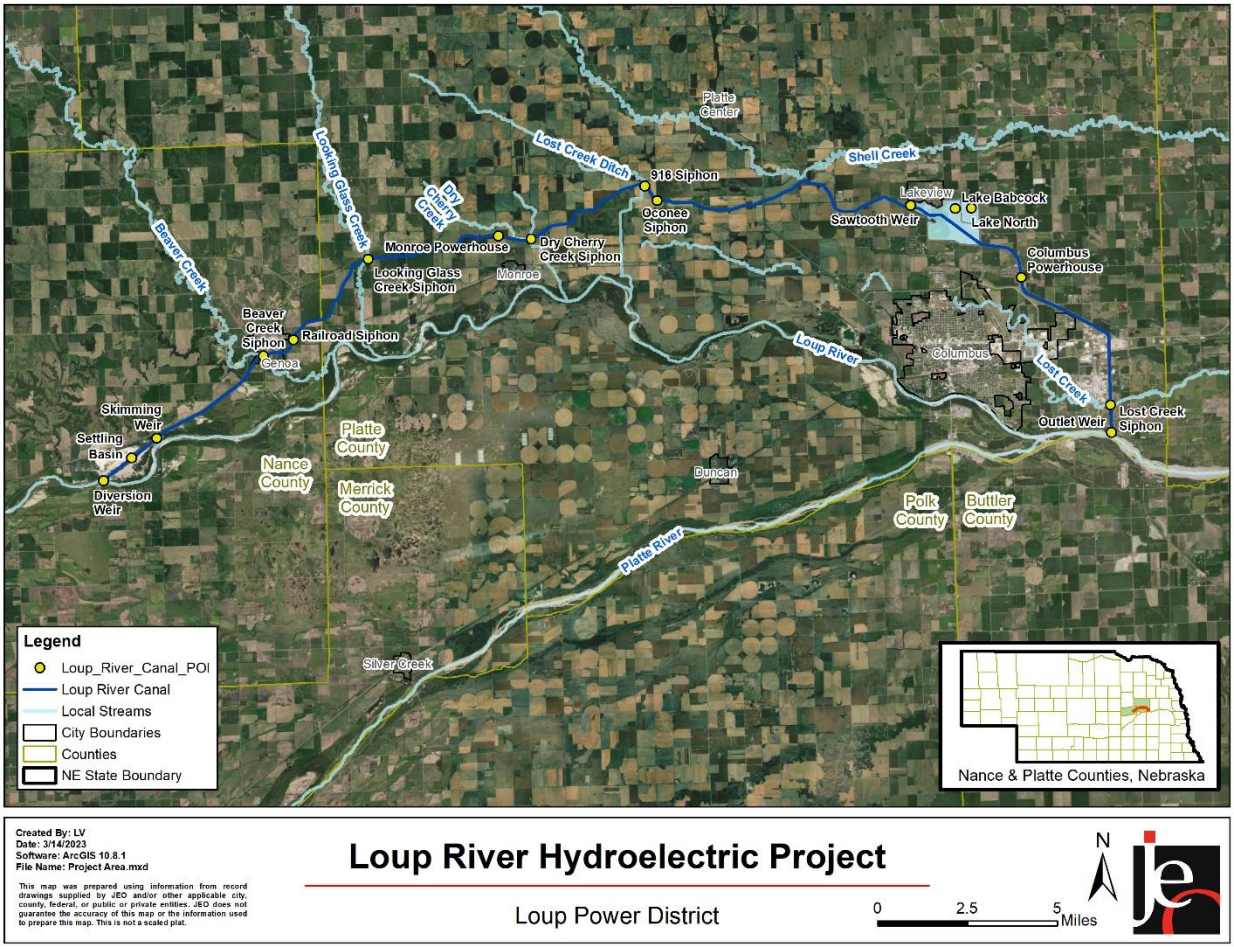

Figure: Site Map

In order to provide decision-makers with the information they need to make an informed decision, the Water Sustainability Fund study will:

- Conduct a hydrographic survey using bathymetry and terrestrial surveying methods and LiDAR to determine the existing and future storage capacity of the lake,
- Find disposal areas for the excavated sediment “spoils”,
- Analyze the physical and chemical properties of the sediment,
- Prepare a conceptual engineering design report and associated documents,
- Develop a preliminary engineer’s opinion of cost for recommended improvements to Lake Babcock,

- Determine the drought resiliency of the green energy hydroelectric power facility based on the rehabilitation of Lake Babcock.

Actual dredging, sediment disposal, improvements to recreational facilities, and final engineering will not be a part of this phase of the project.

While the primary purpose of Lake Babcock is hydroelectric power production; there are other functions that it serves. Lake Babcock and the Loup Power Canal System provides irrigation, recreation, and groundwater recharge for the City of Columbus municipal water supply and the Columbus Groundwater Recharge Project. The lake also serves as storage of flood waters, that helps reduce the sediment loads downstream on the Lower Platte River.

The Canal provides surface water irrigation to users along the canal system. A total of 109 agricultural producers are permitted to withdraw surface water. Additionally, groundwater irrigation is enhanced due to groundwater recharge from the Loup Canal System and Lake Babcock.

Lake Babcock also provides many recreational opportunities. Fish and wildlife and waterfowl are plentiful at Lake Babcock. Two campgrounds in the Lake Babcock area are owned by LPD are provided free of charge to the community. These campgrounds are fully equipped with electrical hookups which are also offered to campers, free of charge. In the northwestern portion of Lake Babcock, LPD provides recreational areas to both the Boy Scouts of America and Girl Scouts of America. The Boy Scouts are based on Boy Scout Island, while the Girls Scouts are based at the Girl Scout Camp.

The City of Columbus North Water Treatment Plant pumps groundwater for drinking water adjacent to Lake Babcock. The groundwater is recharged by the lake. Also, the Lower Loup Natural Resources District Columbus Groundwater Recharge Project receives water from the Loup Power Tailrace Canal. Lake Babcock and the Canal System provide flood control. During the “Spring 2019 Bomb Cyclone,” flood waters from the Loup River were mitigated by use of the Canal System, including Lake Babcock thus preventing further damage to downstream properties. By expanding Lake Babcock’s capacity this will provide additional flood storage capacity.

Finally, the Loup Canal System captures a high volume of sediment from the Loup River, both at the headworks and in Lake Babcock itself. The Tailrace Canal discharges reuse water into the Platte River. This reduced sediment streamflow is beneficial to downstream water users on the Lower Platte River.

Figure: Sand Pile at the Head Gate

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.

Table 2. Project Tasks, Schedule, and Costs

Tasks	Schedule	Costs
Hydrographic Survey and Physical and Chemical Testing	Summer 2023	$32,500
Conceptual Engineering Design Report including locating sites for sediment disposal	2023/Spring 2024	$52,250
Preliminary Engineer's Opinion of Cost	2023/Spring 2024	$21,500
Project Management	2023/Spring 2024	$18,750
Total		$125,000

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; NA

1.A.2 Describe the plan of development (004.01 A); NA

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

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

1.A.5 Describe any necessary water and/or land rights including pertinent water supply and water quality information (004.01 D); NA

1.A.6 Discuss each component of the final plan (004.01 E); NA

1.A.7 When applicable include the geologic investigation required for the project (004.01 E 1); NA

1.A.8 When applicable include the hydrologic data investigation required for the project (004.01 E 2); NA

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). NA

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

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

The traditional method of restoring capacity in lakes with sedimentation issues is by dredging. The proposed Lake Babcock Capacity Study for Multiple Beneficial Use (the Study) will provide critical information to decision-makers on how to successfully dredge the lake. Survey grade Global Positioning System (GPS) equipment, LiDAR, and aerial imagery will be used to measure the existing capacity of the lake and to estimate the future capacity of the lake once dredging is complete. Physical and chemical samples will be taken of the sediment and analyzed for soil properties and chemical composition. This information will be critical to determine the appropriate sediment disposal methods and locations.

The Loup Power District (LPD) has been in service since 1934 and employs 121 staff to operate the hydroelectric power production facility. The staff consists of technical personnel including engineers, scientists, and technicians. LPD personnel have extensive experience in dredging as they operate a dredging system at the headworks to the Loup Power Canal. LPD will hire a qualified consulting firm to conduct the hydrographic survey, prepare a conceptual engineering design, and develop a cost opinion for recommended improvements. The consulting team will be led by a professional engineer licensed in the State of Nebraska. The team will also consist of engineers, scientists, hydrologists, surveyors, and technicians.

Figure: Sandpile at the Headworks of the Loup Power Canal

Actual dredging, sediment disposal, improvements to recreational facilities, and final engineering will not be a part of this phase of the project.

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

The proposed Lake Babcock Water Sustainability Fund Study will determine the existing and future storage capacity of Lake Babcock, analyze the properties of the existing sediment, prepare conceptual engineering design documents, and develop a preliminary engineer's opinion of cost for the dredging of Lake Babcock. The actual implementation of the Study will be a future project and not part of this funding request.

Hydrographic Survey

The LPD will conduct a hydrographic survey using bathymetry with LiDAR, aerial imagery, and terrestrial land surveys. Data collection points will be laid-out and located on a horizontal grid pattern. The controlling factor is the shallowness of Lake Babcock. The most effective method for the bathymetric survey is to use survey grade Global Positioning System (GPS) attached to a measuring rod. Data collection will occur from a small barge. Key depths to be measured include the water-surface elevation, top of the submerged sediment (silt/sand layer) bed elevation, and at the refusal the underlying hardpan surface elevation. Terrestrial land surveys will be conducted with a survey grade GPS and will follow the same horizontal grid pattern. Terrestrial land surveys, LiDAR and available imagery will be used for surface data. These data sources will be the most appropriate for the surveys of spoils disposal sites such as neighboring farm fields (or borrow pits) and as base maps for the more detailed GPS surveys.

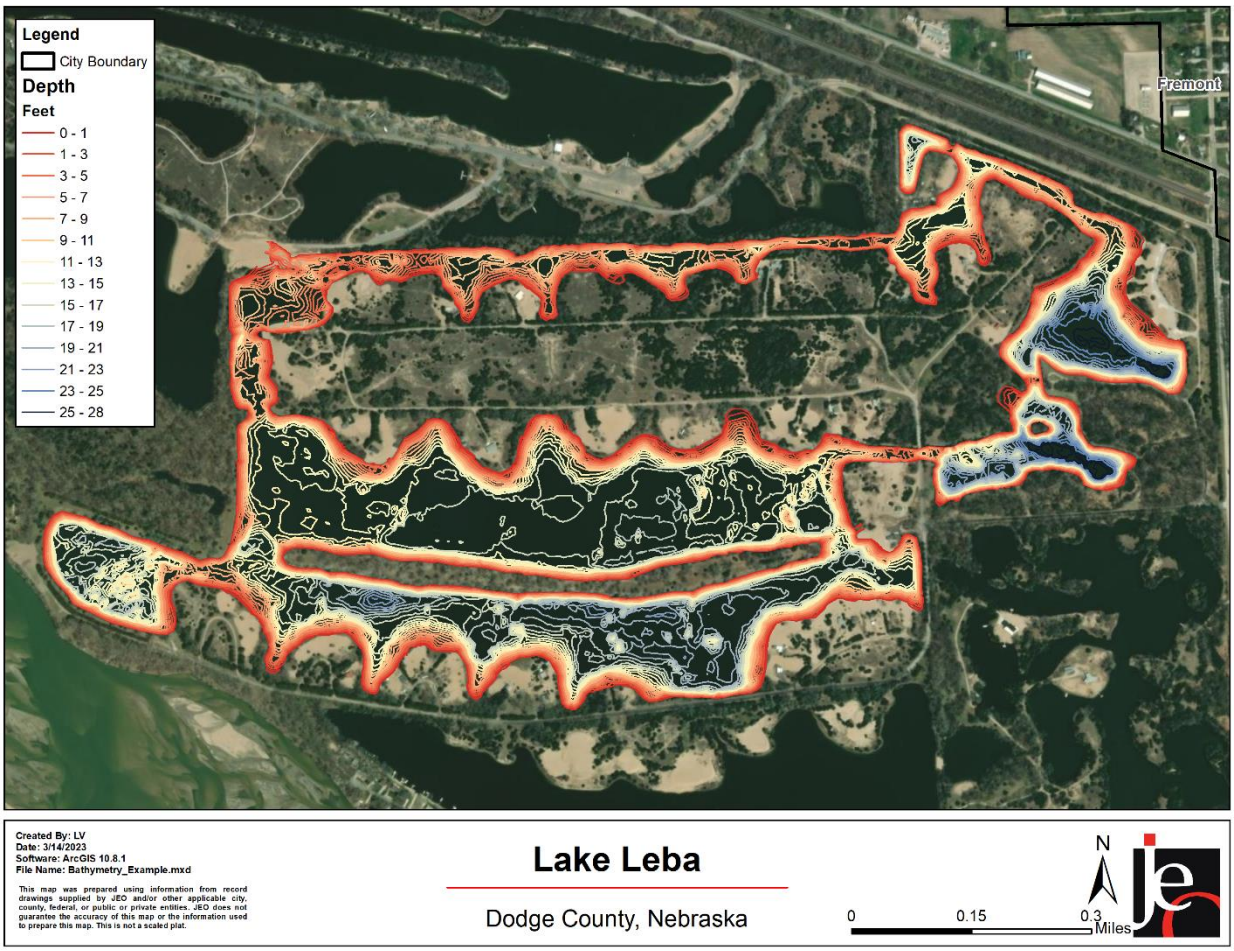

Figure: Example Bathymetric Map

Contour maps will be created using LiDAR and available imagery. These contours will be combined with the GPS data collected during the hydrographic surveys. This will be the basis of the contour maps.

From the bathymetric survey, three contour maps will be generated. The first contour map will be of the existing top of the submerged sediment (silt/sand bed). This layer will be the top of the excavation. The second contour map will be of the underlying hardpan surface (harden clay layer). The third contour map will be approximately one foot above the hardpan surface and will be the bottom of the excavation. The decision to leave one foot of sediment is to provide a protective buffer for the hardpan surface.

For the land surface contour maps, GPS data will be combined with the available LiDAR and aerial imagery.

The quantity of sediment “spoils” to be dredged will be estimated by subtracting the elevations of the third bathymetric contour map from the elevations of the first

bathymetric contour map. This amount of spoil material is expected to be significant due to the footprint of the original Lake Babcock (approximately 1,150 total acres). Disposal of the dredged sediment will be based on cost-effectiveness on the availability of disposal sites.

Physical and Chemical Analysis of the Sediment

Analyzing the physical and chemical properties of Lake Babcock sediment is important to determine the composition of the material for disposal. Samples of the sediment material at various locations and depths will be collected across the lake. The nature of the mixture will be analyzed to determine if the material can be applied to farm fields, deposited in existing borrow pits, used as berm material, or for island/land building at Boy Scout Island and Girl Scout Camp. The chemical constituents are expected to contain nutrients such as nitrogen and phosphorus, as well as other chemical properties. Disposal locations and methods will be dictated by the physical and chemical properties of the sediment.

Conceptual Engineering Design Report

A Lake Babcock Conceptual Engineering Design Report (the Report) will be prepared. Conceptual design is approximately 30% design. Elements of the report will contain many components including construction drawings. These drawings will detail items such as excavation and spoil disposal areas and depths, quantities, berms, and recreational areas such as Boy Scout Island. The contour maps which have been discussed in the hydrographic survey section, will be the basis of the construction drawings of the lake. LiDAR and aerial imagery and terrain surveys will be used for farm fields and borrow pits. The Report will discuss in detail the dredging operations. The majority of the excavation will likely be done by barge. Hauling, dumping, and spreading of the sediment “spoil” materials will be addressed in the Report. It will consider the life expectancy of the dredged lake, practices to extend the lake’s design life, and installation of additional settling basins in the canal system that capture silt and sand.

Preliminary Engineers Opinion of Cost

A Lake Babcock Preliminary Engineers Opinion of Cost will be prepared, based on the hydrographic survey, physical and chemical analysis of the sediment, dredging operations and quantities, spoil material disposal, contouring of the dredged lake, berms, sediment control structures, recreational facilities, and increased hydroelectric power production and economic analysis that result from improving the lake. The cost opinion will be developed first when the Study is 30% complete and revised as the project unfolds.

Project Management

Project management will be important to ensure that the project meets the condensed schedule and delivers a technically sound planning document. Project management activities include: the development of forms for project kickoff, project tracking, progress reports, action items, other forms of documentation, agendas, meeting minutes, monthly invoicing, monthly progress reports, and project closeout actions. These project management activities will assist the LPD in preparing for the future dredging project (not a part of this project) by preparing the hydrographic survey, conceptual engineering design, and preliminary engineer's opinion of cost.

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

Hydrographic Survey

The project will entail a hydrographic survey using bathymetry with LiDAR and aerial imagery, and terrestrial land surveys. Data collection points will be laid-out and located on a horizontal grid pattern. The controlling factor is the shallowness of Lake Babcock. Consideration was given to using an acoustic echosounder mounted to a boat to conduct the bathymetric survey. However, this method will not be feasible, due to the shallow water. The most effective method for the bathymetric survey is to use survey grade Global Positioning System (GPS) attached to a measuring rod. Data collection will occur from a small barge. Key depths to be measured include the water-surface elevation, top of the submerged sediment (silt/sand layer) bed elevation, and at the refusal the underlying hardpan surface elevation. Terrestrial land surveys will be conducted with a survey grade GPS and will follow the same horizontal grid pattern. Extra land data will be located at important features such as grade changes, buildings, weirs, berms, disposal pits, Boy Scout Island, and Girl Scout Camp. LiDAR and available imagery will be used for surface data. These data sources will be the most appropriate for the surveys of spoils disposal sites such as neighboring farm fields and as base maps for the more detailed GPS surveys.

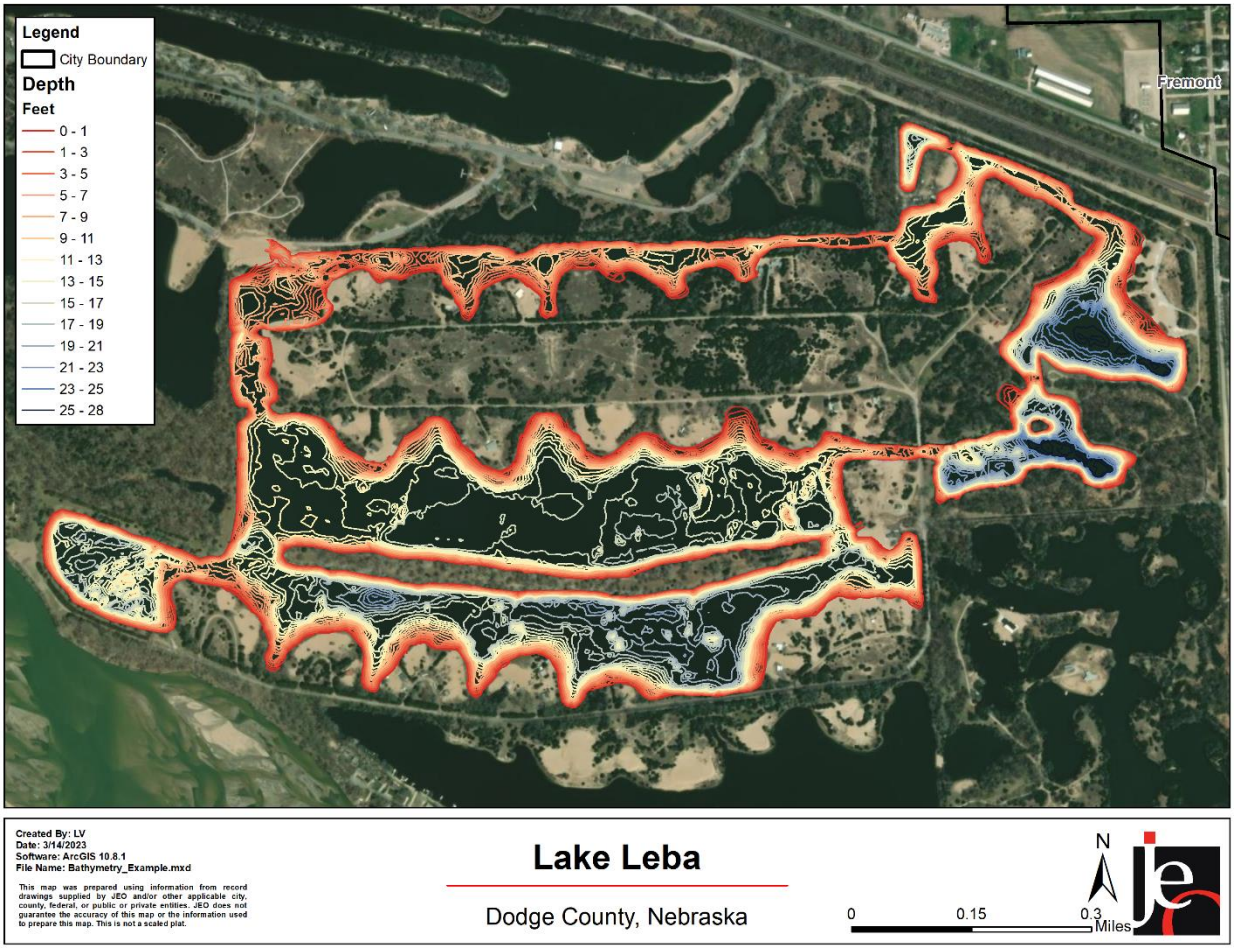

Figure: Example Bathymetric Map

Outreach will be conducted by the surveyors when they demonstrate the use and collection of GPS data with the scouts.

Contour maps will be generated from LiDAR and available imagery. These contours will be combined with the GPS data collected during the bathymetric and terrestrial surveys. This will be the basis of the contour maps. From the bathymetric survey, three contour maps will be generated. The first contour map will be of the existing top of the submerged sediment (silt/sand bed). This layer will be the top of the excavation. The second contour map will be of the underlying hardpan surface (harden clay layer). The third contour map will be approximately one foot above the hardpan surface and will be the bottom of the excavation. The decision to leave one foot of sediment is to provide a protective buffer for the hardpan surface. For the land surface contour maps GPS data will be combined with the available LiDAR and aerial imagery.

The quantity of sediment “spoils” to be dredged will be estimated by subtracting the elevations of the third bathymetric contour map from the elevations of the first

bathymetric contour map. This amount of sediment material is expected to be significant due to the footprint of the original Lake Babcock (approximately 1,150 acres). Disposal of the dredged sediment will be based on cost-effectiveness on the availability of disposal sites.

Physical and Chemical Analysis of the Sediment

Analyzing the physical and chemical properties of Lake Babcock sediment are important to determine the composition of the material for disposal. Samples of the sediment material at various locations and depths will be collected across the lake. It is expected that the spoils will be a mixture of primarily silt and sand. The nature of the mixture will be analyzed to determine if the material can be applied to farm fields, deposited in existing borrow pits, used as berm material, or for island/land building at Boy Scout Island and Girl Scout Camp. The chemical constituents are expected to contain nutrients such as nitrogen and phosphorus, as well as other chemical properties. Disposal locations and methods will be dictated by the physical and chemical properties of the sediment.

1.B.4 Describe any necessary water and/or land rights (004.02 C);

Lake Babcock Capacity Study for Multiple Beneficial Use will not require any additional water rights. LPD Canal has a water right from the Loup River of 3,500 cubic feet per second that was granted on April 15th, 1932. LPD owns Lake Babcock and the Loup Power System land, therefore land rights will not be necessary. Access to potential disposal sites may be needed if the LPD borrow pits do not have adequate capacity, but no formal land rights will be required.

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).

The Study is critical for the development of future structural measures. Dredging of Lake Babcock is the fundamental component of future measures. This will be a sizable project since the original footprint of the lake is 1150 acres. The volume of sediment dredged from the lake will be determined by the hydrographic survey conducted as a part of the Study. Transportation and disposal of spoils will also be an important consideration of the study process. Potential disposal sites include neighboring farm fields, existing borrow pits along the Loup Power Canal

Recreational improvements will be made including the buildup of Boy Scout Island and Girl Scout Camp and the two LPD campgrounds.

The final benefit, but perhaps the most important benefit, will be the depth of the lake, therefore its volume will be increased. The greater depth (without expanding

surface area) will reduce the overall evaporation by volume percentage, consequently, the added volume will provide improved drought resiliency for hydroelectric power production.

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 will be to not conduct the Lake Babcock Capacity Study for Multiple Beneficial Use and begin dredging immediately. Without an accurate hydrographic survey, the volume of sediment excavated could vary by 50 to 100 percent. Further, the physical and chemical composition of the material will not be known, making disposal difficult and potentially harmful to the local environment. This haphazard approach will place the Loup Power Canal at great risk due to the unknown quantities and the cost to dispose of the sediment. The LPD does not have the financial resources to assume such a large, unquantified project by itself. Additional funding sources will be needed for implementation of the Study, and without an engineer's opinion of cost, it is very unlikely that outside resources will be secured.

Figure: Sand Deposition

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 cost of the Study is $125,000. This includes a thorough investigation and analysis of Lake Babcock. The amount requested from the Nebraska Natural Resources Commission is $75,000 and the LPD will contribute $50,000. The costs for the tasks of hydrographic survey, physical and chemical testing, conceptual engineering design report, preliminary engineer's opinion of cost, and project management are itemized below in Table 3. The costs were provided by JEO Consulting Group, Inc. at the request of LPD. The consulting team will consist of engineers, scientists, hydrologists, surveyors, and technicians. JEO Consulting Group Inc. has over 85 years of celebrated engineering, architectural, planning, and surveying experience.

The Study will provide many benefits, including the data needed to dredge and dispose of sediment from Lake Babcock and to improve recreational facilities. The added volume will also improve hydroelectric power production for the Loup Power District and its approximately 21,000 service meters plus wholesale customers within a four-county area. Finally, the renovated and expanded lake will provide drought resiliency while generating green energy.

The study will take approximately ten months to complete. Once the recommended dredging of unwanted sediment has been removed from the lake as a part of a future construction phase, the project will have a useful life of approximately 100 years.

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 cost for the Study, as described previously, is shown below in Table 3. The hydrographic survey that consists of bathymetric and terrestrial surveys will be a detailed data collection effort. Lake Babcock is shallow with substantial sedimentation, so methods of data collection will be conducted in an environment that is difficult to wade or survey with an acoustic echosounder. Considering these circumstances, surveying will be conducted from a small boat using a GPS unit mounted to a survey rod. LiDAR and aerial imagery will be used to identify potential disposal sites for the spoil materials. The conceptual engineering design phase of the Study will address the dredging operation and the transportation and disposal of sediment. The preliminary engineer's opinion of cost is critical so that LPD has an understanding of the cost magnitude of the construction and dredging project. The study is estimated to take approximately ten months to complete. Since this is a study, there is not an estimated construction period.

Table 3. Project Tasks and Costs

Tasks	**Costs**
Hydrographic Survey and Physical and Chemical Testing	$32,500
Conceptual Engineering Design Report including locating sites for sediment disposal	$52,250
Preliminary Engineer's Opinion of Cost	$21,500
Project Management	$18,750
Total	$125,000

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 Study is fundamental in providing the detailed data needed to effectively dredge and dispose of sediment from Lake Babcock and to improve recreational facilities. The Study benefits include:

- Determination of the quantity and quality of sediment to be dredged,
- Identification of proper locations in which to dispose of the spoils,
- Determination of the best engineering solution to dredge the lake,
- Identification of where recreational features can be improved such as Boy Scout Island and Girl Scout Camp,
- Installation of sediment detention basins so that sediment will be more easily dredged in the future, and
- Calculation of costs for dredging and disposal of unwanted sediment in the lake.

Ultimately, the outcome of the Study will be the restoration of Lake Babcock expanded beyond the original storage volume, providing increased water sustainability and green energy hydroelectric power production. This added volume will improve hydroelectric power production for the Loup Power District and its approximately 21,000 service meters plus wholesale customers in a four-county area.

Although dredging of the lake is not part of this funding request, the benefits of the dredging construction project are many. For example, dredging will expand the capacity of the lake beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. This is an important distinction because the additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. Hydroelectric power is a critical green energy resource since it supplies renewable power also it does not consume water.

Figure: Vegetation in the Silted-in Area of Lake Babcock

Agricultural producers also receive irrigation water from the Loup Power Canal. The Columbus Groundwater Recharge Project receives supply water from Lake Babcock. Flood waters are stored in the lake; the latest occurrence of this happened during the 2019 “Cyclone Bomb” storm event.

Recreation is a major aspect of Lake Babcock. Currently, both the Boy Scouts and Girl Scouts have campsites at the lake. The lake also has two campgrounds that are open to the public, at no charge. The lake provides prime habitat for fish, wildlife, and waterfowl.

The project will help improve water quality by reducing sediment in return flows to the downstream water users on the Lower Platte River.

The final benefit, but perhaps the most important benefit, will be the depth of the lake, therefore its volume will be increased. The greater depth (without expanding surface area) will reduce the overall evaporation by volume percentage,

consequently, the added volume will provide improved drought resiliency for hydroelectric power production.

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 project costs by tasks are shown in Table 4. The Study is fundamental in providing the data needed to dredge and dispose of sediment from the lake and to improve recreational facilities. The study benefits include:

- Determination of the quantity and quality of sediment to be dredged,
- Identification of proper locations in which to dispose of the spoils,
- Determination of the best engineering solution to dredge the lake,
- Identification of where recreational features can be improved such as Boy Scout Island and Girl Scout Camp,
- Installation of sediment detention basins, so that sediment can be reduced and more easily dredged in the future, and
- Calculation of costs for the dredging and disposal of unwanted sediment in the lake.

Ultimately, the primary benefit will be an improved and expanded Lake Babcock that provides increased water sustainability. This added volume will improve hydroelectric power production for the Loup Power District and its approximately 21,000 service meters plus wholesale customers in a four county area serving approximately 42,000 people.

Table 4. Project Tasks and Costs

Tasks	**Costs**
Hydrographic Survey and Physical and Chemical Testing	$32,500
Conceptual Engineering Design Report including locating sites for sediment disposal	$52,250
Preliminary Engineer's Opinion of Cost	$21,500
Project Management	$18,750
Total	$125,000

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 Study costs are shown in Table 4. The study tasks consist of the hydrographic survey, conceptual engineering report, preliminary engineers' opinion of cost and project management. The benefits are discussed in Section 3.B. In summary, the Study is fundamental in providing the data needed to dredge and dispose of

sediment from the lake and to improve recreational facilities. Ultimately, the primary benefit will be an improved and expanded Lake Babcock that provides increased water sustainability. This added volume will improve hydroelectric power production for the LPD and its approximately 21,000 service meters plus wholesale customers in a four-county area serving approximately 42,000 people. The Study will be the basis to identify the primary tangible benefits for the dredging and disposal, and recreational facilities upgrades project (the dredging project is not part of this funding request).

The next best alternative would be to not conduct the Study and begin dredging immediately. The lower range of the cost of dredging is $5 per cubic yard and there are millions of yards of sediment to be removed and disposed of. Without data on the specific quantity and type of sediment to be removed, the LPD would be exposed to tremendous and uncertain costs that it would be unequipped to handle on its own... To cover the construction costs of dredging, the LPD would need to seek outside funding, such as a combination of a US Bureau of Reclamation WaterSMART grant in conjunction with another Water Sustainability Fund grant. Without an engineer's opinion of cost, it is very unlikely that additional funding would be received.

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.

   Loup Power District certifies that it has sufficient funds to commit to paying $50,000 (40%) of the total project cost of $125,000. The LPD commitment letter to the study and financial assurances is shown in Appendix B.

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

   The LPD has sufficient funds on an annual basis to repay reimbursable costs, and to cover operate, maintain, and replace costs. The LPD received rate payer revenue of approximately $104,000,000 in 2022 and is expected to receive approximately $107,500,000 in 2023.

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

   LPD will not apply for a loan.

7. Describe how the plan of development minimizes impacts on the natural environment (i.e. timing vs nesting/migration, etc.).

The Study will only impact the natural environment during the hydrographic survey. To minimize any impacts the survey will be conducted during the summer outside of migratory bird season. The majority of the hydrographic survey will be conducted by boat and therefore minimizing disturbance to the sediment. Sediment cores will be collected using small auto samplers that are designed to collect the sediment with minimum disturbance.

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

In 1932 the State of Nebraska approved the formation of the Loup River Public Power District, (known today as the Loup Power District) and granted it the right to appropriate Loup River water at 3,500 cubic feet per second for the purpose of hydropower generation. Additionally, the LPD is regulated by the Federal Energy Regulatory Commission (FERC) under FERC license No. 1256. The FERC license authorizes the operation of hydroelectric power production. The LPD staff of engineers, scientists, and technicians are responsible and qualified to conduct this study in conjunction with its engineering consultant.

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

The Study will consider plans and programs of the State of Nebraska and political subdivisions, and the Federal Energy Regulatory Commission (FERC). The Study will work towards goals and objectives outlined in the NeDNR Annual Report to the Legislature and Plan of Work 2021-2022 and the Lower Loup Natural Resources District (LLNRD) Voluntary Integrated Management Plan. The Study will support the Columbus Groundwater Recharge Project by providing recharge water to the area around the City of Columbus. The FERC license requirements will be met.

The NeDNR Annual Report to the Legislature and Plan of Work 2021-2022 identifies six goals that are measurable objectives. These goals are indicative of the long-term goal of protecting and managing water resources in the State of Nebraska. The Lake Babcock Study and future dredging project will help NeDNR meet five of the goals and objectives.

> NeDNR Goal #1 – Establish strong state leadership, involvement, and support for science-based decision making that is necessary to sustain state and local water management outcomes.
>
> The Study will support this goal by demonstrating that the NeDNR supports hydroelectric power production and green energy in the State of Nebraska. Using data derived from the hydrographic survey and sound engineering principles and cost estimating procedures, science-based decisions can be made for the future of Lake Babcock.

NeDNR Goal #2 **-** Provide high quality products and services through the performance of our duties in the areas of floodplain management, flood mitigation planning, dam safety, and survey to promote the safety of all Nebraskans.

The Study and future dredging project will provide flood control benefits. During the “2019 Bomb Cyclone” flood water from the Loup River was stored in the Loup Power Canal System. By expanding the capacity of Lake Babcock additional flood water can be stored to prevent flood damage.

NeDNR Goal #3 - Develop and implement customized and decentralized water management plans established through collaboration with local Natural Resource Districts and stakeholders that provide for long-term sustainability of the state’s water resources.

Based on coordination with LLNRD and many other stakeholders this study and the future dredging project will help NeDNR develop and implement customized and decentralized water management plans. The Study will work towards goals and objectives outlined in the LLNRD Voluntary Integrated Management Plan.

NeDNR Goal #4 - Encourage strong public engagement with multiple constituents and stakeholder groups in planning and implementation activities to ensure that local and state needs are addressed.

Engagement with stakeholders has already begun by communicating information about the Study to interested parties. Numerous stakeholders will be involved in the Study and future dredging project including the City of Columbus, Platte County, irrigation users, local citizens, Nebraska Game and Parks Commission, Boy Scouts and Girl Scouts of America, ADM, Lower Loup NRD, and downstream water users on the Lower Platte River.

Outreach will be conducted by the surveyors when they demonstrate the use and collection of GPS data with the scouts.

NeDNR Goal #5 - Protect existing water uses through collaborative investments in water resource projects, planning, administration and permitting of surface water rights, and the registration of groundwater wells.

The Study and future dredging project are important to restore and increase Lake Babcock storage capacity and therefore ensure that hydroelectric power is generated by LPD. LPD has a surface water right at 3,500 cubic feet per second that dates back to 1932. As one of the oldest water rights in the Loup River Basin, LPD works collaboratively with surface water users with junior rights to share the water resources. As a measure of collaboration, the producers are charged $1 per acre-foot for irrigation water.

The LLNRD Voluntary Integrated Management Plan identifies four measurable goals. These goals contribute to the long-term mission of LLNRD of achieving and sustaining a balance between water users and water supplies within the NRD. The Study and future dredging project will help LLNRD meet three of the goals.

LLNRD Goal 1 - Promote and support a water supply and use inventory based on the best available data and analysis.

> The Study will support water supply and use by utilizing global positioning systems (GPS), LiDAR and aerial imagery to aid in the assessment of sedimentation within Lake Babcock. These technologies will be used in the hydrographic survey and contour map generation and will ensure accurate measurements are made of the sediment volume. Geographic Information System (GIS) and other software will be used in the analysis and in the contour map generation. Sediment volume to be dredged and disposed of is the major cost of the future dredging project.

LLNRD Goal 2 - Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands.

> The Study and future dredging project will help LLNRD maintain a balance between current and future water supplies and demands by augmenting flow to the hydroelectric power generation system, which does not consume water. The dredged lake capacity will be expanded beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. This is an important distinction because the additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. A renovated lake that has expanded storage capacity beyond the original storage volume will improve its habitat. While the expanded capacity improves drought resiliency it also provides deeper water that provides habitat for game fish. The renovated lake will have shallow areas to provide nesting habitat for wildlife.

LLNRD Goal 3 - Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development.

> Once Lake Babcock is restored and expanded, the water storage capacity in LLNRD will be increased. Additionally, agricultural producers in the Loup Canal System will continue to have water for irrigation. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock. As sedimentation increases within the lake, less water is available for groundwater recharge, potentially impacting the wellfield.

The Study and future dredging project will support the Columbus Groundwater Recharge Project by providing water from the Loup Power Tailrace Canal to the groundwater recharge project area. The Columbus Groundwater Recharge Project was created after LLNRD technicians observed water levels near Columbus falling from 2010 to 2014. Irrigation wells, commercial wells, and domestic wells were all impacted by decreased groundwater availability. Rather than utilizing regulatory authority over area water users, the recharge project was created to augment groundwater recharge.

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.

In 1932 the State of Nebraska approved the formation of the Loup River Public Power District, (known today as the Loup Power District) and granted it the right to appropriate Loup River water at 3,500 cubic feet per second for the purpose of hydropower generation. Additionally, the LPD is regulated by the FERC under license No. 1256. The FERC license authorizes the operation of hydroelectric power production. Loup Power District certifies that it has sufficient funds to commit to paying $50,000 (40%) of the total project cost of $125,000. The LPD commitment letter to the Study and financial assurances is shown in Appendix B.

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

If the study and future dredging project is completed, construction methods as well as designing of sediment basin water structures and other features will be used to minimize environmental and ecological impacts.

If the study and future dredging project are not implemented, there will be environmental and ecological impacts. The Loup hydroelectric power production system is a green energy source. If Lake Babcock's storage capacity is diminished hydroelectric power production will be vulnerable. As a result, other non-green energy sources will have to increase production. Lake Babcock provides habitat

for fish, wildlife, and waterfowl. A renovated lake with a large storage capacity will improve its habitat. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock. As the lake becomes silted, less fresh water is available for groundwater recharge, potentially impacting the quality of water in the municipal wellfield.

Figure: Snow Geese on Lake Babcock

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 project is the Lake Babcock Capacity Study for Multiple Beneficial Use (Study). Lake Babcock, located in Platte County near the City of Columbus, Nebraska, serves as a hydropower forebay to the Loup Power Canal Powerhouse.

The forebay is a regulating reservoir that temporarily stores water for hydroelectric power production. As a green energy source, the Loup Power District (LPD) has over 21,000 service connections plus wholesale customers in a four-county area serving approximately 42,000 people. In 1932 the State of Nebraska approved the formation of the Loup River Public Power District, (known today as the Loup Power District) and granted it the right to appropriate Loup River water at 3,500 cubic feet per second for the purpose of hydropower generation. At the Loup Power Canal headworks, the waters of the Loup River flow into the canal and into Lake Babcock and finally the Loup Powerhouse. Sediment dredging has occurred at the headworks since 1937. However, the sediment load is so high that even with the ongoing dredging operation Lake Babcock is experiencing significant sedimentation.

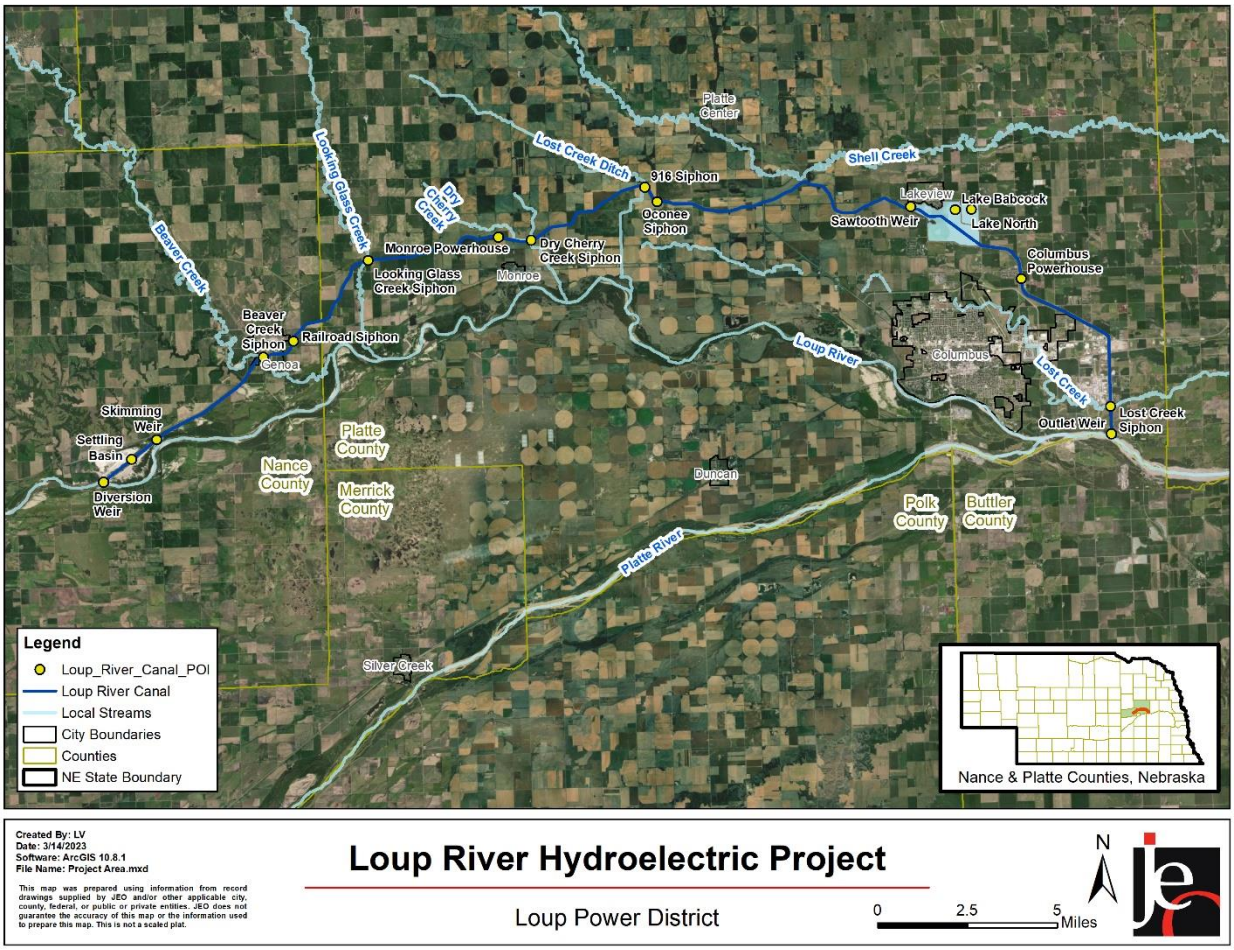

Figure: Site Map

The Study will allow LPD to research the most cost-effective way to remove the buildup of sediment from the lake, thereby improving production and increasing the drought resiliency of this green hydroelectric power system. It is anticipated that the next phase of the project will consist of dredging and disposal of the

sediment and construction of recreational facilities. Dredging and the disposal of the excavated sediment is not part of this Water Sustainability Fund request.

Figure: Lake Babcock

The Study will address a threat to the drinking water supply for the City of Columbus, as well as the nearby Boy Scout Island, Girl Scout Camp, and public campgrounds owned by LPD. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock and provides water to residents of Columbus. In 2021, the population of Columbus was 24,123. Groundwater under the north and west shore of Lake Babcock supplies drinking water to the public campgrounds. As sedimentation continues to affect the lake, the water available for groundwater recharge to these sites decreases in quantity and quality. Sedimentation in Lake Babcock consists of primarily silt and sand from the Loup River which has been deposited into the lake for the past 90 years via the Loup Canal System. This sediment is filling up the lake with as much as ten feet of silt and sand in some locations, reducing the water storage capacity of the lake and threatening groundwater recharge to the wellfield. Additionally, this sediment is anticipated to contain nutrients and other pollutants, such as pesticides. A physical properties

and chemical analysis will be performed on the sediment as part of the Study to determine its properties and quality. This data could be useful information for the groundwater treatment of the North Wellfield.

Figure: City of Columbus North Wellfield

The Study will provide decision makers with the information needed to determine the state of sedimentation and water storage reduction in Lake Babcock. In order to provide decision makers with this data, the Study will:

- Conduct a hydrographic survey using bathymetric and terrestrial surveying methods and LiDAR to determine the existing and future storage capacity of the lake,
- Locate disposal areas for the excavated sediment “spoils”,
- Analyze the physical and chemical properties of the sediment,
- Prepare a conceptual engineering design report and associated documents,
- Develop a preliminary engineer’s opinion of cost for recommended improvements to Lake Babcock, and

- Determine the drought resiliency of the hydroelectric power facility based on the rehabilitation of Lake Babcock.

If the study and future dredging project are not implemented, there will be hydroelectric power production, environmental, ecological, and drinking water impacts. The Loup hydroelectric power production system is a green energy source. If Lake Babcock's storage capacity is diminished, hydroelectric power production will be vulnerable to droughts and electric power supply will be jeopardized for the approximate 42,000 people in the service area.. To compensate, other non-green energy sources such as coal will have to increase production in the State. Without the Study, habitat for fish and wildlife within and around Lake Babcock will also continue to decline in quality. The raised banks of the lake provide the opportunity to increase the capacity of the lake past its original storage volume, providing deep water habitat for fish and shallow nesting areas for wildlife; however, this increase in habitat will not be possible without studying the current sedimentation. Finally, as sedimentation increases within the lake, less fresh water is available for groundwater recharge. Without the Study, municipal water from the City of Columbus wellfield on the south shore of Lake Babcock will potentially experience decreased water quality and quantity.

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 Lake Babcock Capacity Study for Multiple Beneficial Use (Study) will consider plans and programs of the Lower Loup Natural Resources District (LLNRD) Voluntary Integrated Management Plan (IMP). The Nebraska Department of Natural Resources and LLNRD reached a joint agreement on the IMP on March 24th, 2016. The effective date of the IMP is June 8, 2016.

The Loup Power District (LPD) supports LLNRD in achieving the goals of the IMP. For example, as part of the LLNRD Columbus Groundwater Recharge Project, LPD agreed to allow water to be diverted from the Loup Power Tailrace Canal to a groundwater recharge area near the City of Columbus. The Columbus Groundwater Recharge Project was created after LLNRD technicians observed water levels near Columbus falling from 2010 to 2014. Irrigation wells, commercial wells, and domestic wells were all impacted by decreased groundwater availability. Rather than utilizing regulatory authority over area water users, the recharge project was created to augment groundwater recharge. The Study and future dredging project will support the Columbus Groundwater Recharge Project by

providing water from the Loup Power Tailrace Canal to the groundwater recharge project area.

The IMP identifies four measurable goals. These goals contribute to the long-term mission of LLNRD of achieving and sustaining a balance between water users and water supplies within the NRD. The Study and future dredging project will help LLNRD meet three of the goals.

LLNRD Goal 1 - Promote and support a water supply and use inventory based on the best available data and analysis.

> The Study will support water supply and use by utilizing global positioning systems (GPS), LiDAR and aerial imagery to aid in the assessment of sedimentation within Lake Babcock. These technologies will be used in the hydrographic survey and contour map generation and will ensure accurate measurements are made of the sediment volume. Geographic Information System (GIS) and other software will be used in the analysis and in the contour map generation. Sediment volume to be dredged and disposed of is the major cost of the future dredging project.

LLNRD Goal 2 - Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands.

> The Study and future dredging project will help LLNRD maintain a balance between current and future water supplies and demands by augmenting flow to the hydroelectric power generation system, which does not consume water. Since the banks of Lake Babcock have been raised since its construction, the dredged lake capacity will be expanded beyond the original storage volume. This additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. The renovations and expanded storage capacity will also provide better deep-water habitat for fish and increased nesting habitat in shallow areas for wildlife.

LLNRD Goal 3 - Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development.

> Once Lake Babcock is restored and expanded, the water storage capacity in LLNRD will be increased. Additionally, agricultural producers in the Loup Canal System will continue to have water for irrigation. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock. As sedimentation increases within the lake, less water is available for groundwater recharge, potentially impacting the wellfield. With the implementation of the Study and future dredging project, the North Wellfield may experience increased groundwater recharge.

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.

   Lake Babcock plays an essential role in meeting water sustainability goals by providing groundwater recharge to the surrounding area and sediment reduced streamflow to the Platte River. The Study will investigate the groundwater recharge potential of the dredged lake and how current conditions affect aquifer depletion and streamflow.

   Lake Babcock provides surface water for groundwater recharge in multiple locations, including the City of Columbus North Wellfield, the Columbus Groundwater Recharge Project, and nearby domestic wells serving two campgrounds. The Lake has an area of 1,150 acres, just under two square miles. Groundwater levels on the east side of Lake Babcock have declined from 2021 to 2022. The Study will determine the volume of sediment that must be removed to restore and expand the lake. By having the capacity to store a greater amount of water, the expanded lake will provide improved drought resiliency. As part of the Study, the volume of water stored in the lake will be calculated and then used to estimate groundwater recharge and aquifer depletion.

   Lake Babcock also plays a role in maintaining surface water flow. Before it flows into the lake, the Loup Power Canal draws water from the Loup River approximately 6 miles southwest of Genoa, Nebraska. At the canal headworks the velocity of the flow is reduced, allowing part of the sediment consisting of silt and sand to drop out. The canal runs north of the Loup River for approximately 25 miles until it reaches Lake Babcock, which acts as the forebay to the Loup Powerhouse. Within the lake, the significantly reduced velocity causes most of the remaining sediment to drop out. The resulting sediment reduced flow passes through the Loup Canal Powerhouse, where it produces hydroelectric power. The water then flows through the tailrace, where some is diverted for use as recharge surface water in the Columbus Groundwater Recharge Project and the rest is discharged into the Platte River. The canal is designed to carry 3,500 cubic feet per second of water at a velocity of 2.25 feet per second.

The cross-basin benefits of studying the restoration and expansion of Lake Babcock are important. Sediment dredged at the headworks of the Loup Power Canal System totals approximately 1,700,000 cubic yards per year since 1937, reducing the sediment load to Lake Babcock. However, even with the dredging at the headworks, Lake Babcock is still experiencing significant sedimentation over time. The effect of the sediment removed at the headworks and captured by Lake Babcock is beneficial to the flow of the Platte River downstream. By facilitating the dredging and restoration of the lake, the Study will result in reduced sediment to the Lower Platte River, thus providing cross basin benefits.

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.

While the primary purpose of Lake Babcock is hydroelectric power production, it serves other functions as well. Lake Babcock and the Loup Power Canal System provide irrigation, recreation, fish and wildlife habitat, and groundwater recharge for the City of Columbus municipal water supply and the Columbus Groundwater Recharge Project. The lake also serves as storage of flood waters and helps to reduce sediment loads downstream on the Lower Platte River.

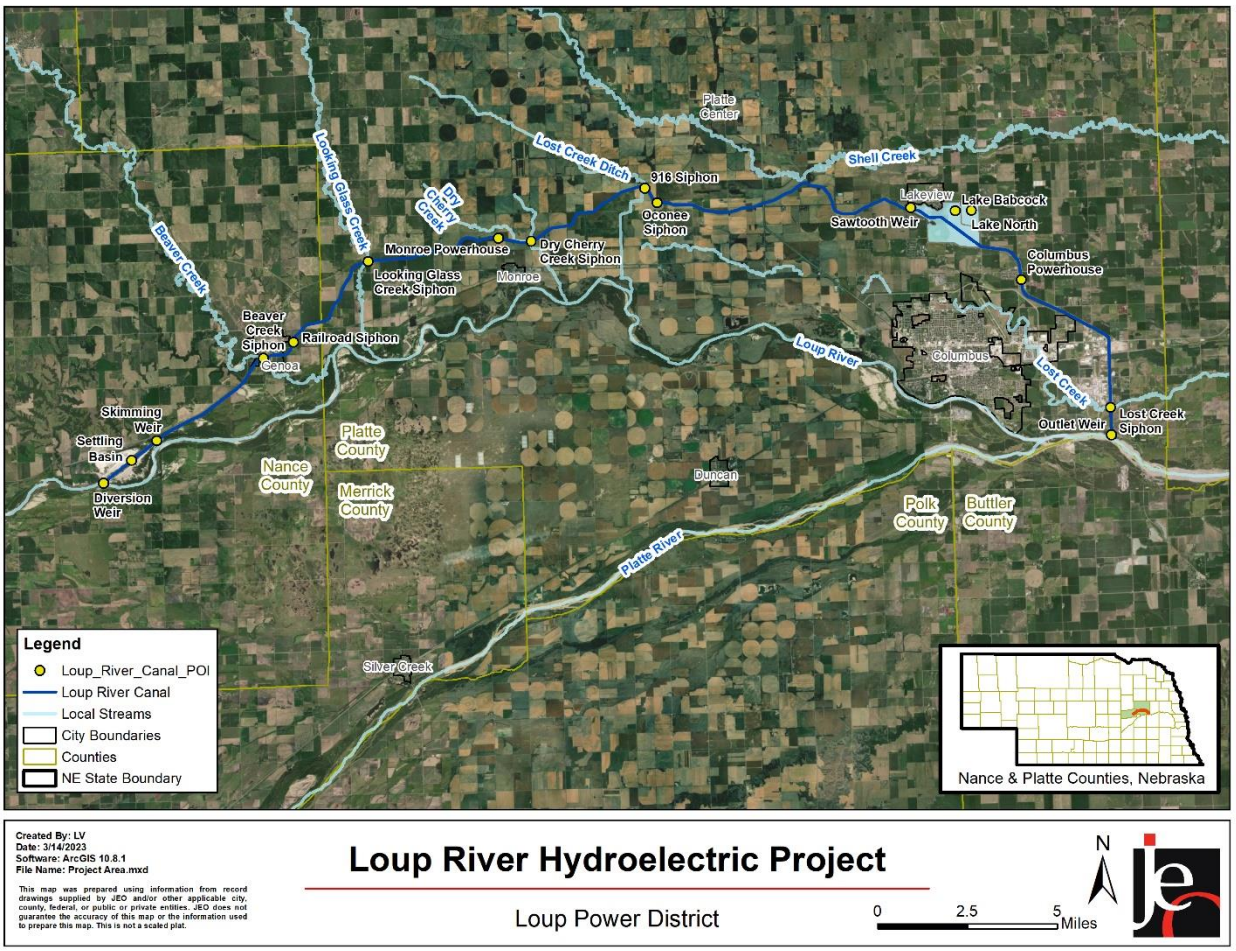

Figure: Site Map

The Study is fundamental in providing the detailed data needed to effectively dredge and dispose of sediment from Lake Babcock and to improve recreational facilities. The Study benefits include:

- Determination of the quantity and quality of sediment to be dredged,
- Identification of proper locations in which to dispose of the spoils,
- Determination of the best engineering solution to dredge the lake,
- Identification of where recreational features can be improved such as Boy Scout Island and Girl Scout Camp,
- Installation of sediment detention basins so that sediment can be reduced and will be more easily dredged in the future, and
- Calculation of costs for dredging and disposal of unwanted sediment in the lake.

The Study will provide these benefits by determining the existing and future storage capacity of Lake Babcock, analyzing the properties of the existing sediment, preparing conceptual engineering design documents, and developing a preliminary engineer's opinion of cost for the dredging of Lake Babcock. The actual

implementation of the Study will be a future project and is not part of this funding request.

Hydrographic Survey

LPD will conduct a hydrographic survey using bathymetry, LiDAR and aerial imagery analysis, and terrestrial land surveys. LiDAR and aerial imagery will be used to provide base data for the bathymetric and terrestrial land surveys. Data collection points within the lake will be located using a horizontal grid pattern. The controlling factor is the shallowness of Lake Babcock. The most effective method for the bathymetric survey is to use survey grade Global Positioning System (GPS) attached to a measuring rod. Data collection will occur from a small barge. Key depths to be measured include the water-surface elevation, top of the submerged sediment (silt/sand layer) bed elevation, and the underlying hardpan surface elevation. Terrestrial land surveys will be conducted with survey grade GPS and will follow the same horizontal grid pattern. Terrestrial land surveys, LiDAR and aerial imagery will be used for surveying borrow pits or spoils disposal sites such as neighboring farm fields.

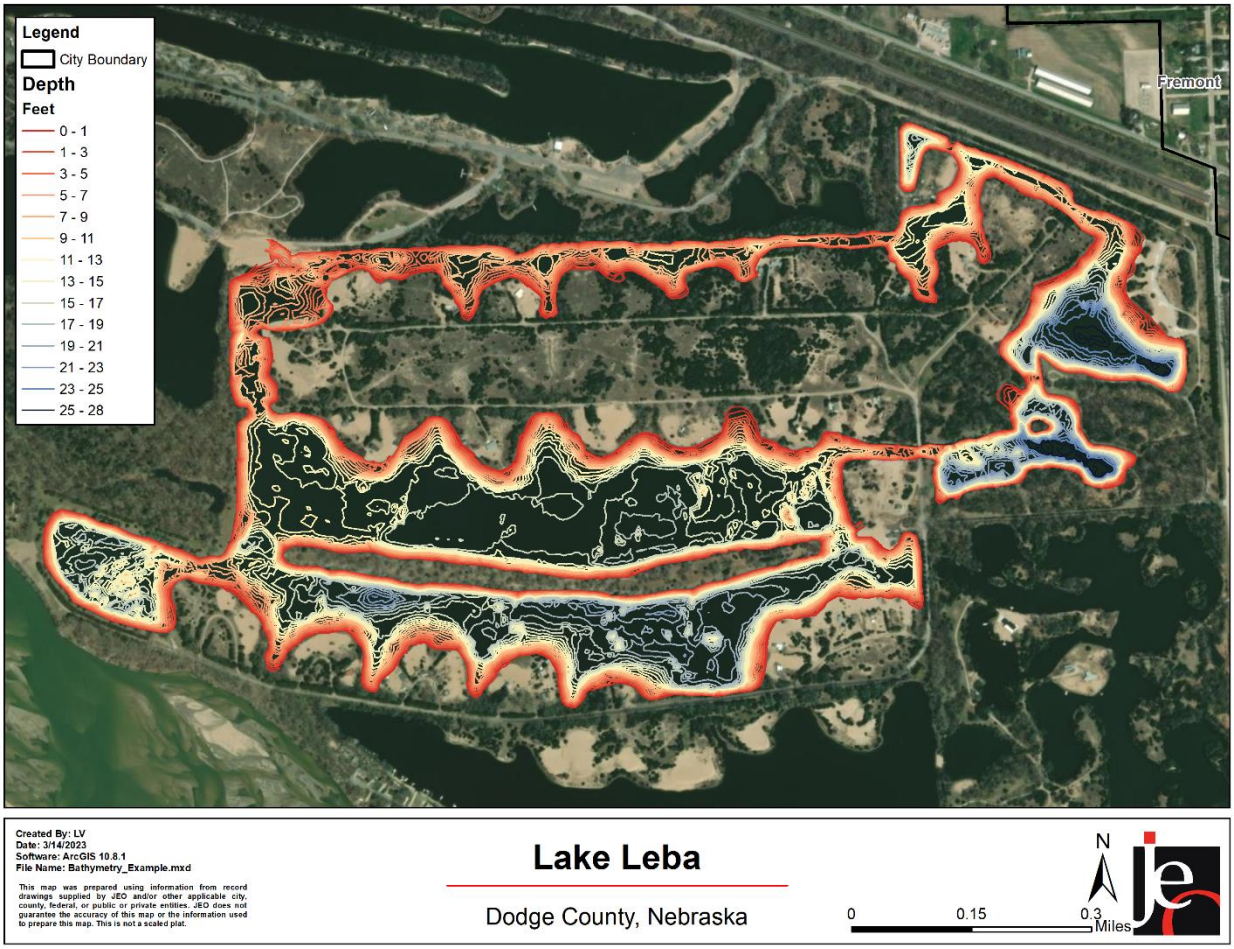

Figure: Example of a Bathymetric Map

Initial contour maps will be created using LiDAR and available imagery, which will then be updated to include the data collected during the hydrographic and terrestrial surveys. From the bathymetric survey, three contour maps will be generated. The first contour map will be of the existing top of the submerged sediment (silt/sand bed). This layer will be the top of the excavation. The second contour map will be of the underlying hardpan surface (hardened clay layer). The third contour map will be approximately one foot above the hardpan surface and will be the bottom of the excavation. The decision to leave one foot of sediment is to provide a protective buffer for the hardpan surface. From the terrestrial survey, land surface contour maps will be created.

Outreach will be conducted by the surveyors when they demonstrate the use and collection of GPS data with the scouts.

The quantity of sediment spoils to be dredged will be estimated by calculating the difference between the elevations at the top of the submerged sediment and the

elevations at one foot above the hardpan surface. The amount of spoil material is expected to be significant due to the footprint of the original Lake Babcock (approximately 1,150 total acres). Disposal of the dredged sediment will be based on the cost-effectiveness and availability of disposal sites.

Physical and Chemical Analysis of the Sediment

Analyzing the physical and chemical properties of Lake Babcock sediment is important to determine the composition of the material for disposal. Samples of the sediment material at various locations and depths will be collected across the lake during the bathymetric survey. Laboratory analysis and physical assessment will be utilized to determine if the material can be applied to farm fields, deposited in existing borrow pits, used as berm material, or used for island or land building at Boy Scout Island and Girl Scout Camp. The chemical constituents are expected to contain nutrients such as nitrogen and phosphorus, as well as possibly other pollutants. Disposal locations and methods will be dictated by the physical and chemical properties of the sediment.

Conceptual Engineering Design Report

A Lake Babcock Conceptual Engineering Design Report (the Report) will be prepared. Conceptual design is approximately 30% of final design. The Report will contain many components, including construction drawings. These drawings will detail items such as excavation and spoil disposal areas and depths, quantities of spoil material, berms, and recreational areas such as Boy Scout Island. The contour maps discussed in the hydrographic survey section will be the basis of the construction drawings. LiDAR, aerial imagery and terrain surveys will be used for farm fields and borrow pits. The Report will also discuss in detail the dredging operations, including hauling, dumping, and spreading of the sediment spoil materials. It will consider the life expectancy of the dredged lake, practices to extend the lake's design life, and installation of additional settling basins in the canal system that capture silt and sand.

Preliminary Engineer's Opinion of Cost

A Lake Babcock Preliminary Engineer's Opinion of Cost will be prepared, based on the hydrographic survey, physical and chemical analysis of the sediment, dredging operations and quantities, spoil material disposal, contouring of the dredged lake, berms, sediment control structures, recreational facilities, and increased hydroelectric power production and economic analysis that result from improving the lake. The cost opinion will be initially developed when the Study is 30% complete and revised as the project unfolds.

Project Management

Project management will be important to ensure that the study meets the condensed schedule and delivers a technically sound planning document. Project management activities include: the development of forms for project kickoff, project tracking, progress reports, action items, other forms of documentation, agendas, meeting minutes, monthly invoicing, monthly progress reports, and project closeout actions. These project management activities will assist LPD in preparing for the future dredging project (not a part of this project) by preparing the hydrographic survey, conceptual engineering design, and preliminary engineer's opinion of cost.

Ultimately, the long-term outcome of the Study will be the restoration of Lake Babcock and its expansion beyond the original storage volume, providing increased water sustainability, drought resiliency, and green energy hydroelectric power production. This added volume will improve hydroelectric power production for the Loup Power District and its approximately 21,000 service meters plus wholesale customers in a four-county area serving approximately 42,000 people.

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 Study will maximize the beneficial use of Nebraska's water resources in several ways. One way is by analyzing the impact of the restored and expanded Lake Babcock on groundwater recharge, surface water irrigation, water supply, flood control, drought resiliency, fish and wildlife habitat, and recreation. Another way is by supplying hydroelectric power, a green energy source that reduces Nebraska's dependence on fossil fuels. The power generated not only benefits the approximately 42,000 people in the LPD service area, but the state as a whole as it diversifies the energy portfolio. Additionally, as a flow through system, the hydroelectric power process does not consume water. The resulting discharge to the Platte River has a reduced sediment load since the silt and sand are captured at the headworks and in Lake Babcock, which is beneficial to the flow of the Platte River. During the restoration and expansion of the lake, additional sedimentation basins will be installed so that even more sediment can be captured and removed, thereby extending the life of the lake for another 100 years.

Figure: Snow Geese on Lake Babcock

No beneficial uses will be reduced by this Study or by the future dredging and sediment disposal project.

While the primary beneficial use of Lake Babcock is hydroelectric power production, it provides other benefits as well. Lake Babcock and the Loup Power Canal System provide irrigation, recreation, fish and wildlife habitat, and groundwater recharge for the City of Columbus municipal water supply and the Columbus Groundwater Recharge Project. The lake also serves as storage of flood waters. The canal provides surface water irrigation to users along the canal system. A total of 109 agricultural producers are permitted to withdraw surface water for $1 per acre-foot. Additionally, groundwater irrigation is enhanced due to groundwater recharge from the Loup Canal System and Lake Babcock. Lake Babcock also provides many recreational opportunities. Fish, wildlife and waterfowl are plentiful at Lake Babcock. Two campgrounds in the Lake Babcock area are owned by LPD and are provided free of charge to the community. These campgrounds are fully equipped with electrical hookups which are also free of charge. In the northwestern portion of Lake Babcock, LPD provides recreational areas to both the Boy Scouts of America and Girl Scouts of America at Boy Scout Island and Girl Scout Camp respectively.

Figure: Looking Towards Boy Scout Island Over Lake Babcock Vegetation

The City of Columbus North Water Treatment Plant pumps groundwater for drinking water adjacent to Lake Babcock. The groundwater is recharged by the lake. Also, the Lower Loup Natural Resources District Columbus Groundwater Recharge Project receives recharge water from the Loup Power Tailrace Canal. Lake Babcock and the Canal System provide flood control. During the spring 2019 bomb cyclone, flood waters from the Loup River were mitigated by use of the Canal System, including Lake Babcock thus preventing further damage to downstream properties. Expanding the capacity of Lake Babcock will provide additional flood storage capacity.

Although dredging and sediment disposal of the lake are not part of this funding request, the benefits of the dredging construction project are many. For example, dredging will expand the capacity of the lake beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. By increasing the volume without increasing surface area, the overall evaporation by volume percentage will be reduced. This is an important distinction because the additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply.

Hydroelectric power is a critical green energy resource since it supplies power to approximately 21,000 service meters plus wholesale customers in a four-county area serving approximately 42,000 people.

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 Lake Babcock Capacity Study for Multiple Beneficial Use is a study and therefore, there will not be construction costs, O/M costs, or land and water acquisition costs.

There is not another method that will achieve the same benefits. The next best alternative would be to not conduct the Study and begin dredging immediately. The lower range of the cost of dredging is $5 per cubic yard and there are millions of yards of sediment in Lake Babcock to be removed and disposed of. Without data on the specific quantity and type of sediment to be removed, LPD would be exposed to tremendous and uncertain costs that it would be unequipped to handle on its own. To cover the construction costs of dredging and disposal, LPD would need to seek outside funding, such as a combination of a U.S. Bureau of Reclamation WaterSMART grant in conjunction with another Water Sustainability Fund grant. Without an engineer's opinion of cost, it is very unlikely that additional funding would be received.

` **Table 1 Project Tasks and Costs**

Tasks	**Cost Estimate**	**WSF Grant Request 60%**	**LPD Cost Share 40%**
Hydrographic Survey and Physical/Chemical Testing	$32,500	$19,500	$13,000
Conceptual Design Report (including locating sites for sediment disposal)	$52,250	$31,350	$20,900
Preliminary Engineers Opinion of Cost	$21,500	$12,900	$8,600
Project Management	$18,750	$11,250	$7,500
Total	$125,000	$75,000	$50,000

The Study is a cost-effective project. The Study involves conducting a detailed bathymetric survey as the foundational scientific component of the entire project

(including future dredging). With the completed survey an accurate estimate of the quantity of sediment to be dredged and disposed of can be made. LPD will conduct the hydrographic survey using bathymetry, LiDAR and aerial imagery analysis, and terrestrial land surveys. LiDAR and aerial imagery will be used to provide base data for the bathymetric and terrestrial land surveys. Data collection points within the lake will be located using a horizontal grid pattern. The controlling factor is the shallowness of Lake Babcock. The most effective method for the bathymetric survey is to use survey grade Global Positioning System (GPS) attached to a measuring rod. Data collection will occur from a small barge. Key depths to be measured include the water-surface elevation, top of the submerged sediment (silt/sand layer) bed elevation, and the underlying hardpan surface elevation. Terrestrial land surveys will be conducted with survey grade GPS and will follow the same horizontal grid pattern. Terrestrial land surveys, LiDAR and aerial imagery will be used for surveying borrow pits or spoils disposal sites such as neighboring farm fields.

The other critical component is the Lake Babcock Preliminary Engineers Opinion of Cost. It will be prepared based on the hydrographic survey, physical and chemical analysis of the sediment, dredging operations and quantities, spoil material disposal, contouring of the dredged lake, berms, sediment control structures, recreational facilities, and increased hydroelectric power production and economic analysis that result from improving the lake. The cost opinion will be initially developed when the Study is 30% complete and revised as the project unfolds.

7. Helps the state meet its obligations under interstate compacts, decrees, or other state contracts or agreements or federal law;

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

The LPD has a Federal Energy Regulatory Commission (FERC) license for operation and maintenance of the Loup River Hydroelectric Project No. 1256.

The Study and the future dredging project will help the State of Nebraska meet its obligations to FERC by providing green hydroelectric energy. The Loup Power Canal Project authorized installed capacity is 50.937 megawatts. With the sedimentation issues within Lake Babcock, water storage capacity is being

reduced and hydroelectric power generation is being threatened. The Study will provide the following information:

- Determination of the quantity and quality of sediment to be dredged,
- Identification of proper locations in which to dispose of the spoils,
- Determination of the best engineering solution to dredge the lake,
- Identification of where recreational features can be improved such as Boy Scout Island and Girl Scout Camp,
- Installation of sediment detention basins so that the sediment will be reduced and more easily dredged in the future, and
- Calculation of costs for dredging and disposal of unwanted sediment in the lake.

The deficiency of the current operating system is the sedimentation of Lake Babcock. Even though dredging at the headworks has removed approximately 1,700,000 cubic yards of sand since 1937, the problem continues. The Study will design additional sediment basins on the Loup Power Canal System so that dredging can occur in multiple locations in the future. The basins will be designed to have easy access for the dredging equipment and haul roads to transport the dredged sand. These improvements are critical to help extend the life of Lake Babcock for another 100 years.

Figure: Dredged Sand Pile at the Headworks

8. Reduces threats to property damage or protects critical infrastructure that consists of the physical assets, systems, and networks vital to the state or the United States such that their incapacitation would have a debilitating effect on public security or public health and safety;

- Identify the property that the project is intended to reduce threats to.
- Describe and quantify reductions in threats to critical infrastructure provided by the project and how the infrastructure is vital to Nebraska or the United States.
- Identify the potential value of cost savings resulting from completion of the project.
- Describe the benefits for public security, public health and safety.

The Study will reduce threats to property damage and critical infrastructure. First and foremost, due to the sedimentation of Lake Babcock, hydroelectric power production is threatened at the Loup Power District Hydroelectric Power Plant. The City of Columbus North Wellfield relies on the lake for groundwater recharge. Additionally, the Columbus Groundwater Recharge Project depends on water from the Loup Canal for recharge. Finally, flood waters are stored in the Loup Power System, including Lake Babcock, such as during the 2019 bomb cyclone event.

For almost 90 years the Loup Power District and Lake Babcock have produced hydroelectric power for residents in the Columbus area. However, the impact of this system extends beyond Columbus and the State of Nebraska. The lake and the Loup Power System provides green energy to the state and to the electric grid throughout the Midwest. LPD has over 21,000 service meters in a four-county area serving a population of approximately 42,000 people. If LPD went offline, other sources of energy would be required, including non-green energy. Lake Babcock plays a crucial role in the system by serving as the forebay to the Loup Hydroelectric Powerhouse. Its role as a forebay is to store water for power production and with diminished storage capacity, hydropower is threatened.

Lake Babcock also plays an essential role in providing groundwater recharge to areas that provide water to the City of Columbus, population 24,123. As Lake Babcock fills in with sediment, less storage is available for water recharge to the North Wellfield. Lake Babcock also provides water via the Loup Power Tailrace Canal to a groundwater recharge area near the City of Columbus as part of the Columbus Groundwater Recharge Project. This project was created after LLNRD technicians observed water levels near Columbus falling from 2010 to 2014. Irrigation wells, commercial wells, and domestic wells were all impacted by decreased groundwater availability. Rather than utilizing regulatory authority over area water users, the recharge project was created to augment groundwater recharge. The Study and future dredging project will support the Columbus Groundwater Recharge Project by providing water from the Loup Power Tailrace Canal to the groundwater recharge project area.

The lower range of the cost of dredging is $5 per cubic yard and there are millions of yards of sediment to be removed and disposed of. Without data on the specific quantity and type of sediment to be removed, LPD would be exposed to tremendous and uncertain costs that it would be unequipped to handle on its own. To cover the construction costs of dredging, LPD would need to seek outside

funding, such as a combination of a U.S. Bureau of Reclamation WaterSMART grant in conjunction with another Water Sustainability Fund grant. Without an engineer's opinion of cost, it is very unlikely that additional funding would be received.

The Study is fundamental in providing the detailed data needed to effectively dredge and dispose of sediment from Lake Babcock and to improve recreational facilities. The Study benefits include:

- Determination of the quantity and quality of sediment to be dredged,
- Identification of proper locations in which to dispose of the spoils,
- Determination of the best engineering solution to dredge the lake,
- Identification of where recreational features can be improved such as Boy Scout Island and Girl Scout Camp,
- Installation of sediment detention basins so that sediment will be reduced and more easily dredged in the future, and
- Calculation of costs for dredging and disposal of unwanted sediment in the lake.

Ultimately, the long-term outcome of the Study will be the restoration of Lake Babcock and its expansion beyond the original storage volume. Since the banks of Lake Babcock have been raised since its construction, the dredged lake capacity will be expanded beyond the original storage volume. This additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. The renovations and expanded storage capacity will also provide better deep-water habitat for fish and increased nesting habitat in shallow areas for wildlife.

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.

Sediment is the major water quality issue addressed in the Study and future dredging and disposal project. Even though sediment is dredged at the headworks, sediment is still flowing into Lake Babcock. As the lake fills up, less sediment storage capacity is available. Therefore, more silt and sand is able to pass through the lake and is released from the Loup Power Canal into the Lower Platte River. Additionally, the sediment likely contains nutrients and other pollutants such as pesticides. These additional pollutants could possibly impact the Columbus North Wellfield, the Columbus Groundwater Recharge Project, and Lower Platte River

water users. The population affected by the sedimentation of Lake Babcock includes not only the approximately 42,000 people in the LPD area, but also a much larger population in the Lower Platte River basin. These people will benefit from the sediment-reduced water that is discharged into the river.

The Study will determine the amount of sediment in Lake Babcock and analyze the physical and chemical properties. This analysis is important to determine the composition of the material for disposal. Samples of the sediment material at various locations and depths will be collected across the lake. The sediment will be analyzed to determine if the material can be applied to farm fields, deposited in existing borrow pits, used as berm material, or used for island or land building at Boy Scout Island and Girl Scout Camp. Disposal locations and methods will be dictated by the physical and chemical properties of the sediment.

Figure: Sand Deposition

An alternative solution to remedy this issue would be the construction of additional sediment basins along the Loup Power Canal. This solution would be useful to reduce the sediment load, but it does not address removing the large amount of

sediment currently in Lake Babcock. LPD has been dredging sediment in the canal system since 1937. To date 1,700,000 cubic yards of sediment have been removed at the canal headworks stilling basin. However, even with this continuous removal of sediment millions of cubic yards have been deposited into Lake Babcock.

10. Has utilized all available funding resources of the local jurisdiction to support the program, project, or activity;

- Identify the local jurisdiction that supports the project.
- List current property tax levy, valuations, or other sources of revenue for the sponsoring entity.
- List other funding sources for the project.

The local jurisdiction is the Loup Power District. LPD is based in Columbus, Nebraska and includes the counties of Platte, Madison, Colfax, and Boone. It serves over 21,000 service meters with an approximate population of 42,000 people.

LPD has sufficient funds on an annual basis to repay reimbursable costs, and to cover operation, maintenance, and replacement costs. LPD received rate payer revenue of approximately $104,000,000 in 2022 and is expected to receive approximately $107,500,000 in 2023.

LPD and the Nebraska Water Sustainability Fund (if approved) are the only funding sources.

Table 2 Project Tasks and Costs

Tasks	Cost Estimate	WSF Grant Request 60%	LPD Cost Share 40%
Hydrographic Survey and Physical/Chemical Testing	$32,500	$19,500	$13,000
Conceptual Design Report (including locating sites for sediment disposal)	$52,250	$31,350	$20,900
Preliminary Engineers Opinion of Cost	$21,500	$12,900	$8,600
Project Management	$18,750	$11,250	$7,500
Total	$125,000	$75,000	$50,000

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

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

The Loup Power District is the local jurisdiction that is the sponsor of the Lake Babcock Capacity Study for Multiple Beneficial Use. There are several plans in place that support sustainable water use for the Study. The Study will consider plans and programs of the State of Nebraska and political subdivisions, and the Federal Energy Regulatory Commission (FERC).

The Study will work towards goals and objectives outlined in the NeDNR Annual Report to the Legislature and Plan of Work 2021-2022 and the Lower Loup Natural Resources District (LLNRD) Voluntary Integrated Management Plan. The Study will support the Columbus Groundwater Recharge Project by providing recharge water to the Christopher's Cove Homeowners Association area near the City of Columbus. The FERC license requirements will be met.

The NeDNR Annual Report to the Legislature and Plan of Work 2021-2022 identifies six measurable goals. These goals contribute to the long-term mission of NeDNR of protecting and managing water resources in the State of Nebraska. The Lake Babcock Study and future dredging project will help NeDNR meet five of the goals and objectives.

> NeDNR Goal #1 – Establish strong state leadership, involvement, and support for science-based decision making that is necessary to sustain state and local water management outcomes.
>
> The Study will support this goal by demonstrating that NeDNR supports hydroelectric power production and green energy in the State of Nebraska. Using data derived from the hydrographic survey, sound engineering principles, and cost estimating procedures, science-based decisions can be made for the future of Lake Babcock.

NeDNR Goal #2 **-** Provide high quality products and services through the performance of our duties in the areas of floodplain management, flood mitigation planning, dam safety, and survey to promote the safety of all Nebraskans.

> The Study and future dredging project will provide flood control benefits. During the spring 2019 bomb cyclone, floodwater from the Loup River was

stored in the Loup Power Canal System, including Lake Babcock. The dredged lake capacity will be expanded beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. By expanding the capacity of Lake Babcock, additional floodwater can be stored to prevent flood damage.

NeDNR Goal #3 - Develop and implement customized and decentralized water management plans established through collaboration with local Natural Resource Districts and stakeholders that provide for long-term sustainability of the state's water resources.

Based on coordination with LLNRD and many other stakeholders, this study and the future dredging project will help NeDNR develop and implement customized and decentralized water management plans. The Study will work towards goals and objectives outlined in the LLNRD Voluntary Integrated Management Plan.

NeDNR Goal #4 - Encourage strong public engagement with multiple constituents and stakeholder groups in planning and implementation activities to ensure that local and state needs are addressed.

Engagement with stakeholders has already begun by communicating information about the Study to interested parties. Numerous stakeholders will be involved in the Study and future dredging project, including the City of Columbus, Platte County, Nebraska Game and Parks Commission, Boy Scouts and Girl Scouts of America, ADM, Lower Loup NRD, irrigation users, local citizens, and downstream water users on the Lower Platte River.

Outreach will be conducted by the surveyors when they demonstrate the use and collection of GPS data with the scouts.

NeDNR Goal #5 - Protect existing water uses through collaborative investments in water resource projects, planning, administration and permitting of surface water rights, and the registration of groundwater wells.

The Study and future dredging project are important to restore and increase Lake Babcock storage capacity and therefore ensure that hydroelectric power is generated by LPD. The dredged lake capacity will be expanded beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. LPD has a surface water right to 3,500 cubic feet per second that dates back to 1932. As one of the oldest water rights in the Loup River Basin, LPD works collaboratively with surface water users with junior rights to share the water resources. As a measure of collaboration, the producers are charged $1 per acre-foot for irrigation water.

The LLNRD Voluntary Integrated Management Plan (IMP) identifies four measurable goals. These goals contribute to the long-term mission of LLNRD of achieving and sustaining a balance between water users and water supplies within the NRD. The Study and future dredging project will help LLNRD meet three of the goals.

LLNRD Goal 1 - Promote and support a water supply and use inventory based on the best available data and analysis.

> The Study will support water supply and use by utilizing global positioning systems (GPS), LiDAR and aerial imagery to aid in the assessment of sedimentation within Lake Babcock. These technologies will be used in the hydrographic survey and contour map generation and will ensure accurate measurements are made of the sediment volume. Geographic Information System (GIS) and other software will be used in the analysis and in the contour map generation. Sediment volume to be dredged and disposed of is the major cost of the future dredging project.

LLNRD Goal 2 - Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands.

> The Study and future dredging project will help LLNRD maintain a balance between current and future water supplies and demands by augmenting flow to the hydroelectric power generation system, which does not consume water. Since the banks of Lake Babcock have been raised since its construction, the dredged lake capacity will be expanded beyond the original storage volume. This additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. The renovations and expanded storage capacity will also provide better deep-water habitat for fish and increased nesting habitat in shallow areas for wildlife.

LLNRD Goal 3 - Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development.

> Once Lake Babcock is restored and expanded, the water storage capabilities in LLNRD will be increased and hydroelectric power production will be maintained. Additionally, agricultural producers in the Loup Canal System will continue to have water for irrigation. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock. As sedimentation increases within the lake, less water is available for groundwater recharge, potentially impacting the wellfield. With the implementation of the Study and future dredging project, groundwater recharge for the North Wellfield will be protected.

The Study and future dredging project will support the Columbus Groundwater Recharge Project by providing water from the Loup Power Tailrace Canal to the groundwater recharge project area. The Columbus Groundwater Recharge Project was created after LLNRD technicians observed water levels near Columbus falling from 2010 to 2014. Irrigation wells, commercial wells, and domestic wells were all impacted by decreased groundwater availability. Rather than utilizing regulatory authority over area water users, the recharge project was created to augment groundwater recharge.

The stakeholders for the proposed Study include:

- The City of Columbus
- Lower Loup Natural Resources District
- Federal Energy Regulatory Commission (FERC)
- The Columbus Groundwater Recharge Project
- Boy Scouts of America
- Girls Scouts of America
- Nebraska Game and Parks Commission
- Platte County
- Nebraska Department of Natural Resources
- The approximately 42,000 citizens residing in the LPD
- The citizens of the State of Nebraska that use hydroelectric power
- 109 irrigators in the LPD service area
- Archer Daniels Midland
- Loup River upstream users that have water rights junior to the LPD
- Platte River downstream users that receive the sediment reduced water

The letters of support from the stakeholders are shown in Appendix A.

All of the stakeholders will benefit from the Study and future dredging project. The City of Columbus North Well Field will have a more reliable source of recharge water with the expansion of Lake Babcock. The LLNRD IMP goals will be met. The FERC will have a hydroelectric power plant actively continuing to produce green energy. The Columbus Groundwater Recharge Project, including the City of Columbus, Christophers Cove Homeowners Association, ADM, and Platte County, will continue to receive canal water for recharge. The Boy Scouts of America will benefit from a built-up Boy Scout Island. The Girl Scouts of America will benefit from an improved Girl Scout Campground. Nebraska Game and Parks Commission supports this project because it supports fish, wildlife, and waterfowl. The Nebraska Department of Natural Resources Annual Report goals will be met. The approximately 42,000 people in the LPD service will have a more reliable source of drought resilient hydroelectric power. The citizens of Nebraska will benefit from the green energy source of hydroelectric power. The 109 agricultural producers in the LPD canal system will have water for irrigation. The downstream Platte River users will receive sediment-reduced water.

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 Study and future dredging project will address issues facing the State of Nebraska. First and foremost, the Study will address the issue of Loup River sedimentation. Sedimentation is a problem for the 42,000 people in the LPD service area and for the downstream water users on the Lower Platte River who depend on sediment-reduced water. The project will address the issue of having a robust and diversified portfolio of energy sources in the state. The Study will also address the problem of drought resiliency for this statewide hydroelectric resource. The Study and future dredging project will benefit the approximately 42,000 citizens in the LPD service area and the 1,966,000 citizens of Nebraska.

The issue of sedimentation derived from the Loup River affects the LPD service area. By restoring and expanding Lake Babcock many issues will be resolved, including hydropower production, water supply, fish and wildlife habitat, irrigation flows, groundwater recharge, and reduced sediment load for downstream water users on the Lower Platte River. The benefits derived from reducing the sediment in Lake Babcock and the Loup Power Canal System are important to the State of Nebraska. The restored and expanded lake will provide green energy hydroelectric power. Additionally, the downstream water users on the Lower Platte River will benefit from the reduced sediment load.

The State of Nebraska is adversely affected by having a small number of energy sources. A robust and diversified portfolio of energy sources such as coal, hydroelectric, natural gas, nuclear, wind and solar is vital to the state. An important benefit will be that the project will help contribute green energy to a diversified portfolio of energy sources. By ensuring the resiliency of a green energy source, the Study also helps to reduce the state's reliance on fossil fuels. Additionally, hydroelectric power production does not consume water.

Drought resiliency for statewide hydroelectric resources is another issue that this project would address. Since the banks of Lake Babcock have been raised since its construction, the dredged lake capacity will be expanded beyond the original storage volume. This additional storage capacity will provide drought resiliency for hydroelectric power production and municipal water supply. The renovations and expanded storage capacity will also provide better deep-water habitat for fish and increased nesting habitat in shallow areas for wildlife.

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.

Loup Power District
LPD is the lead partner and funding authority for the Study. They will work and coordinate with stakeholder organizations and the public that may be affected by the recommendations contained within the Study. A consultant will be hired for the Study. LPD will work with NeDNR on the implementation of the Study, grant management, and technical and procedural reviews.

NeDNR
NeDNR will serve as the lead funding and technical agency for the Study. As the grant administrator, NeDNR will have an important role in the Study, especially involving the coordination between LPD and NeDNR.

Table 3 Project Tasks and Costs

Tasks	Cost Estimate	WSF Grant Request 60%	LPD Cost Share 40%
Hydrographic Survey and Physical/Chemical Testing	$32,500	$19,500	$13,000
Conceptual Design Report (including locating sites for sediment disposal)	$52,250	$31,350	$20,900
Preliminary Engineer's Opinion of Cost	$21,500	$12,900	$8,600
Project Management	$18,750	$11,250	$7,500
Total	$125,000	$75,000	$50,000

Loup Power District certifies that it has sufficient funds to commit to paying $50,000 (40%) of the total project cost of $125,000. The LPD commitment letter to the study and financial assurances is shown in Appendix B.

LPD has sufficient funds on an annual basis to repay reimbursable costs, and to cover operation, maintenance, and replacement costs. LPD received rate payer revenue of approximately $104,000,000 in 2022 and is expected to receive approximately $107,500,000 in 2023.

If the Water Sustainability Fund (WSF) does not approve this project, then LPD will be forced to use revenue from its operating budget or reapply for a WSF grant next year.

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.

If the Study and future dredging and disposal project is completed, construction methods and design of sediment basin water structures and other features will be used to minimize watershed impacts. If the Study and future dredging project are not implemented, there will be watershed-scale environmental and ecological effects on the Loup Canal Power System and on the downstream water users on the Lower Platte River. As part of the future dredging project, millions of cubic yards of silt and sand will be removed from Lake Babcock. It is likely that the sediment will contain pollutants such as nutrients and pesticides. The more sediment that is captured, the more beneficial it will be for water quality.

Lake Babcock provides prime habitat for fish, wildlife, and waterfowl. During a field visit to the lake on March 7, 2023, ten bald eagles were sighted along with thousands of ducks and geese. Fishing will be improved by providing deeper water for game fish while maintaining some areas of shallow habitat for other species.

Figure: Snow Geese on Lake Babcock

Additionally, the expansion of Lake Babcock will improve drought resiliency and increase the availability of water for groundwater recharge. The City of Columbus North Wellfield is situated on the south shore of Lake Babcock. As the lake becomes silted, less fresh water is available for groundwater recharge, potentially impacting the quality of water in Lake Babcock and the municipal well field.

Figure: Lake Babcock Habitat

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 Study will work towards goals and objectives outlined in the NeDNR Annual Report to the Legislature and Plan of Work 2021-2022. The NeDNR Annual Report identifies six measurable goals. These goals contribute to the long-term mission of NeDNR of protecting and managing water resources in the State of Nebraska. The Study and future dredging project will help NeDNR meet five of the goals and objectives.

> NeDNR Goal #1 – Establish strong state leadership, involvement, and support for science-based decision making that is necessary to sustain state and local water management outcomes.

The Study will support this goal by demonstrating that NeDNR supports hydroelectric power production and green energy in the State of Nebraska. Using data derived from the hydrographic survey and sound engineering principles and cost estimating procedures, science-based decisions can be made for the future of Lake Babcock.

NeDNR Goal #2 **-** Provide high quality products and services through the performance of our duties in the areas of floodplain management, flood mitigation planning, dam safety, and survey to promote the safety of all Nebraskans.

The Study and future dredging project will provide flood control benefits. During the spring 2019 bomb cyclone, floodwater from the Loup River was stored in the Loup Power Canal System, including Lake Babcock. The dredged lake capacity will be expanded beyond the original storage volume. This is possible because the banks of Lake Babcock have been raised, thus increasing the volume capacity. By expanding the capacity of Lake Babcock additional flood water can be stored to prevent flood damage.

NeDNR Goal #3 - Develop and implement customized and decentralized water management plans established through collaboration with local Natural Resource Districts and stakeholders that provide for long-term sustainability of the state's water resources.

Based on coordination with LLNRD and many other stakeholders this study and the future dredging project will help NeDNR develop and implement customized and decentralized water management plans. The Study will work towards goals and objectives outlined in the LLNRD Voluntary Integrated Management Plan.

NeDNR Goal #4 - Encourage strong public engagement with multiple constituents and stakeholder groups in planning and implementation activities to ensure that local and state needs are addressed.

Engagement with stakeholders has already begun by communicating information about the Study to interested parties. Numerous stakeholders will be involved in the Study and future dredging project, including the City of Columbus, Platte County, Nebraska Game and Parks Commission, Boy Scouts and Girl Scouts of America, ADM, Lower Loup NRD, irrigation users, local citizens, and downstream water users on the Lower Platte River.

Outreach will be conducted by the surveyors when they demonstrate the use and collection of GPS data with the scouts.

NeDNR Goal #5 - Protect existing water uses through collaborative investments in water resource projects, planning, administration and permitting of surface water rights, and the registration of groundwater wells.

The Study and future dredging project are important to restore and increase Lake Babcock storage capacity and therefore ensure that hydroelectric power is generated by LPD. LPD has a surface water right to 3,500 cubic feet per second that dates back to 1932. As one of the oldest water rights in the Loup River Basin, LPD works collaboratively with surface water users with junior rights to share the water resources. As a measure of collaboration, the producers are charged $1 per acre-foot for irrigation water.

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

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

The Energy Policy Act 42 USC 15852 and 13201 (2005) addresses energy production in the United States including.

- Energy efficiency
- Renewable energy
- Oil and gas
- Coal
- Nuclear
- Hydropower
- Geothermal

In accordance with Section 203, each fiscal year the federal government must consume at least 7.5% of its total electricity from renewable sources such as hydroelectric power.

The Study and future dredging project will also help meet the Federal Agency Use of Renewable Electric Energy under the Federal Energy Management Program (FEMP). FEMP helps agencies meet statutory renewable electricity requirements and accomplish their missions through investing in lasting and reliable energy-generation projects.

The Study and future dredging project will provide green energy hydroelectric power production helping the federal government meet their energy consumption requirements. Additionally, this process does not consume water. The restoration and expansion of Lake Babcock will provide hydroelectricity and increase drought resiliency thereby helping the FERC achieve its mission of authority over the power sector's interstate operations and planning activities.

The relationship between the federal mandate and the project will further the goals of water sustainability. There are multiple FERC requirements that interact with hydropower production along with federal law and executive orders. Having a robust and expanded capacity to hold water within Lake Babcock will help meet the goals of water sustainability.

APPENDIX A
LETTERS OF SUPPORT

Appendix B
Loup Power District Commitment Letter