NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: CKRWP Source Solution and System Upgrades

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

Sponsor Business Name: Lewis and Clark Natural Resources District (LCNRD)

Sponsor Contact's Name: Annette Sudbeck

Sponsor Contact's Address: 608 N Robinson Ave., PO Box 518, Hartington, NE 68739

Sponsor Contact's Phone: 402-254-6758

Sponsor Contact's Email: asudbeck@lcnrd.org and lcnrd@hartel.net

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

   Grant amount requested. $ 8,481,000

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

   If a loan is requested amount requested. $ No loan requested

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

The required permits for the project shall include a G&P Threatened and Endangered species consultation and cultural resources evaluation; a NDEE National Pollutant Discharge Elimination System (NPDES) general permit; a construction permit from the Nebraska Department of Environment and Energy (NDEE); Cedar and Knox County right of way occupancy permits; Nebraska Department of Transportation (DOT) right of way occupancy permits; building and electrical permits; and Knox and Cedar County floodplain and/or zoning approvals. Permits will be obtained during the design phase of the project in 2023. WSF will cost share the necessary permits. It is anticipated the cost for necessary permits will not exceed $25,000.

4. **Partnerships**

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

There are three (3) primary Partners/Co-sponsors responsible for carrying out the project including the Lewis and Clark Natural Resources District (LCNRD), the Cedar Knox Rural Water Project (CKRWP), and the Nebraska Department of Environment and Energy (NDEE). As Project Sponsor and owner of CKRWP, LCNRD accepts all financial and legal responsibility. Commitment letters for CKRWP and NDEE are included as Attachments A. and B. respectively.

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

Lewis and Clark Natural Resources District (LCNRD)

The Lewis and Clark Natural Resources District (LCNRD) is the Project Sponsor. LCNRD is responsible for oversight of the Cedar Knox Rural Water Project (CKRWP) operations and is ultimately responsible for financial commitments of CKRWP and projects undertaken. LCNRD ratified action taken by the CKRWP Advisory Committee to pursue the proposed project which includes conversion from the existing surface water source to an identified groundwater source in Dolphin Township, Knox County and other activities identified in the CKRWP 2021 Preliminary Engineering Report (PER) prepared by CKRWP engineering firm, Bartlett and West (B&W) (Attachment C) and described below under the CKRWP Co-Sponsor heading. As Project Sponsor, LCNRD accepts all financial and legal commitments necessary to complete the project.

Cedar Knox Rural Water Project (CKRWP) – Co-Sponsor

The Cedar Knox Rural Water Project (CKRWP) is Project Co-Sponsor and fully supports the proposed project. CKRWP is responsible for the day-to-day operation of the water system and for maintaining a viable system for long-term service to customers through the Advisory Committee that provides recommendations to LCNRD for ratification. CKRWP has conducted preliminary engineering over the last seven years to evaluate options and determine the best path forward to secure the most cost effective, resource effective long-term, resilient water supply to serve the needs of CKRWP customers. The PER has been prepared in response to a Nebraska Department of Environment and Energy (NDEE) issued Administrative Order (AO), encroaching sediment and flood impacts on the surface water intake, limited production capacity of the CKRWP water treatment plant, and limited capacity of distribution system components.

The proposed project consists of three phases, conversion from a surface water source to a groundwater source requiring development of groundwater well fields; construction of a water treatment plant to address hardness and potentially nitrates and/or manganese; and upgrades to existing and construction of new distribution system

components to bring the groundwater source on-line and to address water line and storage capacity throughout the system. The CKRWP Advisory Committee unanimously approved implementing the proposed project, to address the AO and other concerns at the December 2021 CKRWP board meeting. The proposed project includes development of a groundwater source and well fields in Dolphin Township, Knox County, construction of a new treatment plant in close proximity to the well fields, and additions/upgrades to the distribution system. CKRWP has included a letter of support (Attachment A.) which includes all financial and legal commitments necessary to complete the project.

Nebraska Department of Environment and Energy (NDEE)

The Nebraska Department of Environment and Energy (NDEE) administers the Nebraska Drinking Water State Revolving Fund (DWSRF) program, which provides low interest loans and grant forgiveness to owners of public drinking water systems. CKRWP plans to utilize the DWSRF to fund their cost share of the project. NDEE is also administering an American Recovery Plan Act (ARPA) funding award provided to this project through action of the 2022 Nebraska Legislature and assigned to NDEE for implementation. NDEE has endorsed the project through a Letter of Support, which is included as Attachment B.

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.

CKRWP is prepared to begin the design process for the three phases of the proposed project and is requesting financial support from the Water Sustainability Fund (WSF) to cost-share the design, permitting, and construction of the project.

Other sources of funding include the following:

1. American Recovery Plan Act (ARPA) funds – Nebraska Legislature dedicated **$7 million** awarded to the project during the 2022 Legislative session – match is not required, and this amount is deducted from the total cost of the project before consideration of NDEE for funding through the State Revolving Fund.

2. State Revolving Fund (SRF) loan forgiveness – up to 50% of the remaining cost, after ARPA funding, is eligible for loan forgiveness assistance through this source. The total awarded by SRF is **$10.865 million** based on communications with NDEE and review of the Drinking Water State Revolving Fund (DWSRF) 2022 Intended Use Plan (IUP) which lists the total for both loan forgiveness and loan.

3. Cedar Knox Rural Water Project (CKRWP) is responsible for all expenses not covered by other sources. If the request for WSF funding is awarded, CKRWP will be responsible for **$5.654 million**. If WSF funding is not awarded, CKRWP will be responsible for the remaining $14.135 million. The funds for CKRWP are collected via customer fees. Table 1. represents a breakdown of project costs and funding sources.

4. LCNRD is requesting **$8.481 million** from WSF which is 60% of the remaining $14.135 million.

Table 1. Project Costs and Funding Sources

Activity	Cost Estimate	ARPA Share	SRF Share	WSF Grant Request	Local Share
				60%	40%
Engineering Design and Construction AdminServices for Distribution System Improvements	$535,000		$230,000	$183,000	$122,000
Engineering Design and Construction Admin Services for WTP, Wells, and Transmission Facilities	$2,150,000	$1,000,000	$494,500	$393,300	$262,200
Permitting	$25,000		$10,000	$9,000	$6,000
Other Professional Services (legal, fiscal, administrative, etc.)	$750,000		$322,500	$256,500	$171,000
Land Easement Acquisitions	$1,900,000		$817,000	$649,800	$433,200
Well Field Development	$2,330,000	$1,350,000	$436,200	$326,280	$217,520
Water Treatment Plant Construction & Observation	$17,940,000	$4,650,000	$5,714,700	$4,545,180	$3,030,120
Distribution System Construction	$6,370,000		$2,840,100	$2,117,940	$1,411,960
Total	**$32,000,000**	**$7,000,000**	**$10,865,000**	**$8,481,000**	**$5,654,000**

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 Cedar Knox Rural Water Project (CKRWP) provides drinking water to approximately 3,000 residents in northern Cedar and Knox Counties of northeast Nebraska. CKRWP is a regional system that treats surface water drawn from Lewis and Clark Lake (Lake) impounded by Gavins Point Dam. Customers include 4 communities Crofton, Fordyce, St. Helena, and Obert; more than 900 rural connections; several campgrounds; and several Sanitary Improvement Districts (SIDs) and housing developments (see Figure 1. page 11).

CKRWP experiences several issues related to the water source in the Lake that negatively impact the system and the ability of CKRWP to continue providing drinking water without making significant system changes. CKRWP and LCNRD have identified converting to a local groundwater source, new water treatment plant, and distribution system additions/upgrades as the most viable option to address these concerns for the long-term.

There are three primary impacts that must be addressed by CKRWP when securing long-term service. **First,** the intake structure located in the Lake is expected to be inundated by sediment in approximately 20 years or less. The advancing sediment concern is compounded by the impacts of flood events similar to those of 2011 and 2019, see Figure 2. (page 12), which represents sediment advancement in Lewis and Clark Lake. When the sediment reaches and covers the intake it will no longer be a viable structure to supply water to the treatment plant in the amount needed to produce drinking water for current CKRWP customers. The US Army Corps of Engineers (USACE) provided a letter to LCNRD in 2018 indicating, in part, USACE's understanding that sedimentation is a chronic concern, however; Gavins Point dam and the Lake are meeting their designed purpose and no action is planned to address sedimentation. LCNRD does not have the financial or technical ability to address the sediment and is forced to identify an alternative to the Lake to meet the source water needs for CKRWP. **Secondly,** as the sediment approaches the intake structure there is an increase in organic material carried by the flowing water and drawn into the intake that must be treated and removed. Increased organic material requires additional chlorination. The impact of elevated chlorination is the production of Safe Drinking Water Act (SDWA) regulated disinfection byproducts. CKRWP is under Administrative Order (AO) to address one of these byproducts, Total-Trihalomethanes (TTHM). **Finally,** production capacity of the treatment plant and capacity in portions of the distribution system are at or near their maximum sustainable levels. In addition, areas of the distribution system infrastructure require updates or additions including line replacement, upsizing and improvements, water tower replacement, and other needs.

Several options to address the above concerns were evaluated in a Preliminary Engineering Report completed by CKRWP engineer Bartlett and West (B&W) in

conjunction with the University of Nebraska Lincoln, Conservation and Survey Division (UNL-CSD) and engineering firm, LRE Water. The lowest initial project construction cost option was identified as purchasing finished water from Yankton, SD which ultimately results in the highest cost to customers over time. Other options have also been considered and are detailed in Section B. number 3B of this application. After full deliberation the CKRWP Advisory Committee determined development of a well field, construction of a new treatment plant, and construction of distribution system upgrades offers the lowest cost to customers over the life of the facilities and is the best alternative to secure long-term service of a safe, reliable drinking water source.

Converting to a groundwater source will address concerns that exist with the Lake intake. Locating a groundwater source of sufficient quantity with desirable quality in northeast Nebraska has been challenging due to geologic/hydrogeologic variability. The proposed well field in Dolphin Township of Knox County has been identified through an intensive, detailed aquifer investigation conducted in partnership with UNL-CSD, Eastern Nebraska Resources Assessment (ENWRA), and the Nebraska Environmental Trust (NET). Additional testing is required for final development and is included in the design phase of the project. Treatment of the groundwater source(s) will be required due to hardness, manganese, and/or nitrates. The water served from the existing water treatment plant is softened due to the treatment process in place. Treatment of the identified groundwater source will ensure a similar product is delivered to customers without the need to purchase a water softener.

The federal SDWA recognizes the people served by CKRWP are entitled to safe drinking water. Nebraska Title 179 regulations establish drinking water standards for public water systems as authorized in Neb. Rev. Stat. §§71-5301 to 71-5313. These programs provide for the protection of human health and prevents drinking water health hazards through the control and regulation of public water systems and drinking water testing. The Source Solution and System Upgrades project supports strong state leadership and involvement on a state concern to effectively meet drinking water needs for residents.

LCNRD is requesting financial support from the WSF for the design, permitting, and construction of a long-term water supply system for CKRWP. It is anticipated that the water supply system will be completed and fully functional by the end of 2026. The timeline corresponds to the required project completion requirements of ARPA funding.

7. **Project Tasks and Timeline**

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

Tasks	Year 1$	Year 2$	Year 3$	Remaining	Total $ Amt.
Permits	$18,000				$18,000
Engineering		$96,000			$96,000

Construction	$87,000	$96,000		$183,000
Close-out			$8,000	$8,000
			TOTAL	$305,000

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

LCNRD is requesting financial support from the WSF for the design, permitting, and construction of a long-term water supply system for CKRWP. It is anticipated that the water supply system will be completed and fully functional by the end of 2026. The timeline corresponds to the required project completion requirements of ARPA funding. The project tasks and timeline is reported in Table 2.

Table 2. Project Tasks and Timeline

Task	Year 1	Year 2	Year 3 & 4	Total
	2023	2024	2025-2026	Amount
Engineering Design and Construction Admin Services for Distribution System Improvements	$350,000	$185,000		$535,000
Engineering Design and Construction Admin Services for WTP, Wells, and Transmission Facilities	$1,150,000	$500,000	$500,000	$2,150,000
Permitting	$20,000	$5,000		$25,000
Other Professional Services (legal, fiscal, administrative, etc.)	$375,000	$225,000	$150,000	$750,000
Land Easement Acquisitions	$1,000,000	$450,000	$450,000	$1,900,000
Well Field Development	$654,000	$1,676,000		$2,330,000
Water Treatment Plant Construction	$3,440,000	$10,000,000	$4,500,000	$17,940,000
Distribution System Construction & Observation	$3,500,000	$2,000,000	$870,000	$6,370,000
Totals	**$10,489,000**	**$15,041,000**	**$6,470,000**	**$32,000,000**

8. **IMP**

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

Project Sponsor, LCNRD completed an Integrated Management Plan (IMP) in partnership with the Nebraska Department of Natural Resources (NeDNR) in 2016. Reports and data updates are provided to NeDNR as identified in the IMP.

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;

The Cedar Knox Rural Water Project (CKRWP) worked with University of Nebraska Lincoln – Conservation and Survey Division (UNL-CSD) to conduct an investigation of groundwater resources for consideration as an alternative source for CKRWP. The results of the investigation were provided to CKRWP contracted engineering firms for inclusion in the 2021 Preliminary Engineering Report (PER) which is included as Attachment C. and is the feasibility report that complies with Title 261, Chapter 2.

The 2021 PER was completed by Bartlett and West (B&W) with sections provided by UNL-CSD, and subcontracted engineering firm, LRE Water (LRE). The 2021 PER includes a water system study that evaluates methods to address an Administrative Order (AO) issued by the Nebraska Department of Environment and Energy (NDEE), the existing water supply, treatment process, and distribution system upgrades to meet long-term needs of CKRWP. The 2021 PER also includes assessment of alternatives to increase system capacity and address the AO that were originally prepared in prior PERs completed by B&W in 2016 and 2017 (Attachments D. And E.). Several of the options identified to increase capacity and/or to address the AO (probable AO in 2016) as part of the 2016 and 2017 PERs were only briefly revisited in the 2021 PER because the options were determined to not be viable long-term solutions due to being cost prohibitive, ineffective for addressing the AO, or not able to meet long-term needs. In addition, a review of the Geologic and Hydrogeologic Conditions in the Devils Nest region of Lewis and Clark Lake (Lake) and the surrounding area was completed by Leggette, Brashears and Graham, Inc. in 2017 and is included as Attachment F. The geological information is important when considering the feasibility of B&W proposals that include moving the intake within the Lake and investigation of a potential groundwater source in close proximity to the existing CKRWP water treatment plant.

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

CKRWP is a rural water system that serves 4 communities Crofton, Fordyce, St. Helena, and Obert; more than 900 rural connections; several campgrounds; and several Sanitary Improvement Districts (SIDs) and housing developments including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten, Lewis and Clark Estates, Hideaway Acres, Autumn Oaks, Prairie Ridge, Bon Homme, Cedar Hills and the Becker Addition. The CKRWP service area is represented in Figure 1.

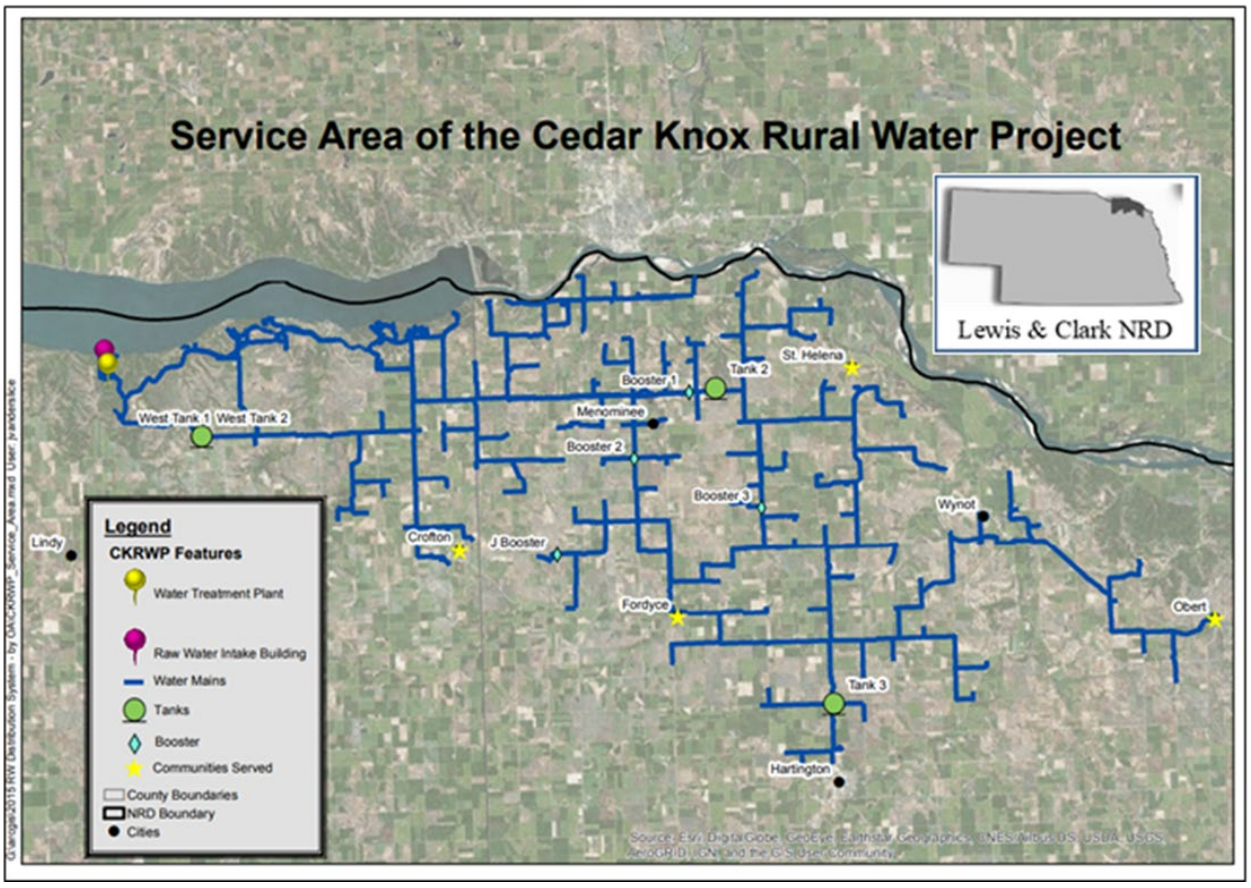

Figure 1. Cedar Knox Rural Water Project service area.

The system faces three primary concerns that have prompted development of the plan to convert from the current surface water source to an identified groundwater source in Dolphin Township of Knox County as detailed below.

1. The intake structure located in the Lake is expected to be inundated by sediment in approximately 20 years or less. The advancing sediment concern is compounded by the impacts of flood events similar to those of 2011 and 2019, see Figure 2. which represents sediment advancement in the Lake based on information provided by the Missouri Sedimentation Action Coalition (MSAC). When the sediment reaches and covers the intake it will no longer be a viable structure to supply water to the treatment plant in the amount needed to produce drinking water for current CKRWP customers. The Omaha

office of the US Army Corps of Engineers (USACE) provided a letter to LCNRD in 2018 (Attachment G.) that states in part “Our staff here understand that sedimentation is a chronic concern and have been working on a number of studies to evaluate reservoir sustainability and long-term operations. At this time, none of the studied actions have proven cost effective to implement.” Therefore, LCNRD must identify an alternative to the Lake to meet source water needs for CKRWP.

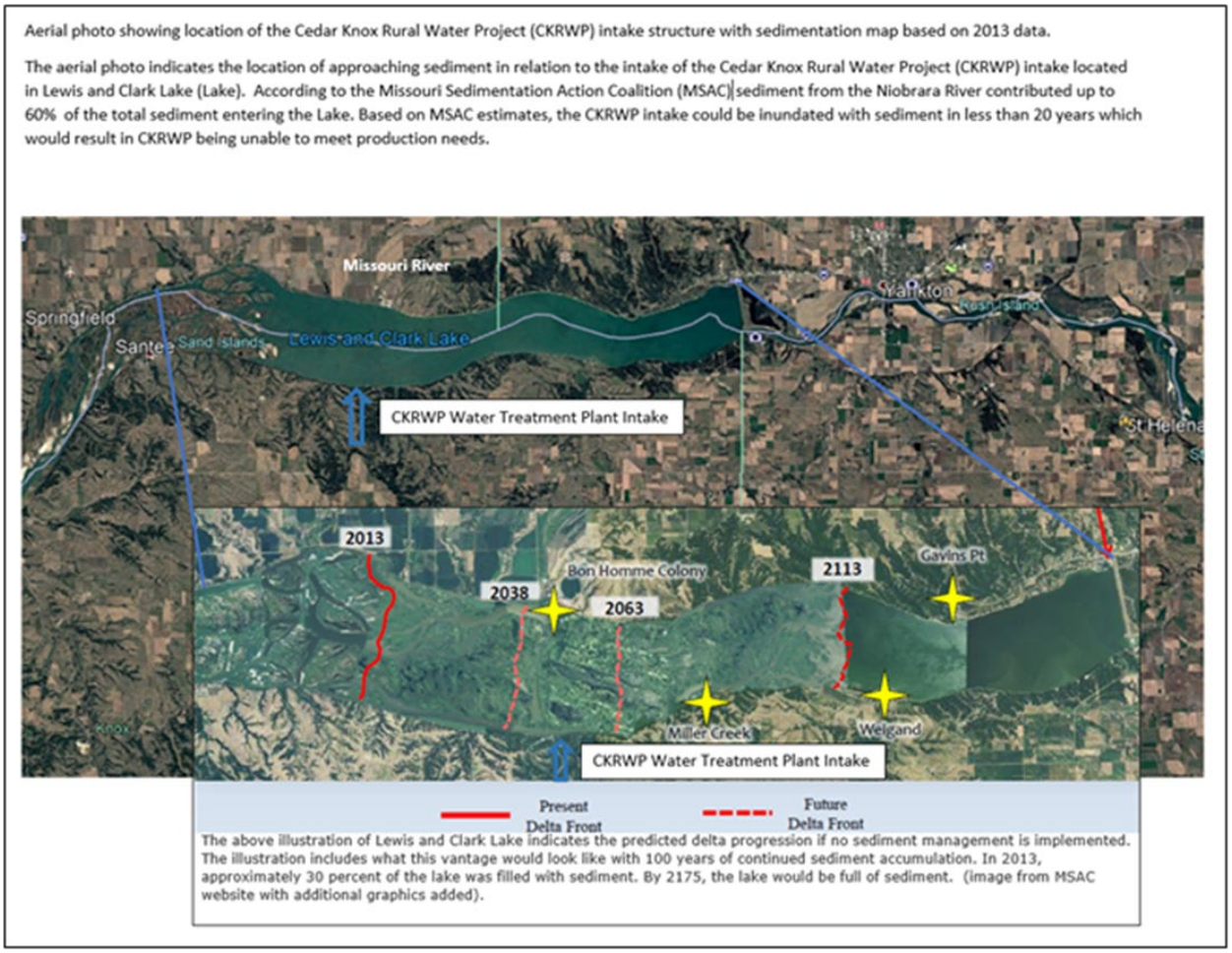

Figure 2. Progression of sediment advancement representation from the Missouri Sedimentation Action Coalition website

Encroaching sediment in the Lake originates from the bed of the Missouri River and from stream and river systems, especially the Niobrara River, that discharge into the Lake and carry high levels of sediment and organic matter as observed above the surface level of the Lake. The reservoir is experiencing significant sedimentation, with an estimated one-half of the sediment load due to sand input from the Niobrara River (Cowman, Tim, 2013 Lewis & Clark Illustration Project, Missouri Sedimentation Action Coalition, USD Missouri River Institute, Vermillion, SD). The mouth of the Niobrara River is located approximately 18½ miles upstream of the CKRWP

intake facility. A delta, named the Lewis and Clark delta, extends from the mouth of the Niobrara River to a location approximately 2¾ miles upstream of the CKRWP intake facility. A portion of the delta is shown in Figure 3. According to Cowman (2013), the average rate of downstream delta front migration is approximately 400 feet per year, although during periods of high flow, it can advance much more rapidly; it advanced approximately 4,800 feet as a result of the 2011 Missouri River flooding. It is estimated that the delta front will reach the CKRWP intake facility in approximately 20 years.

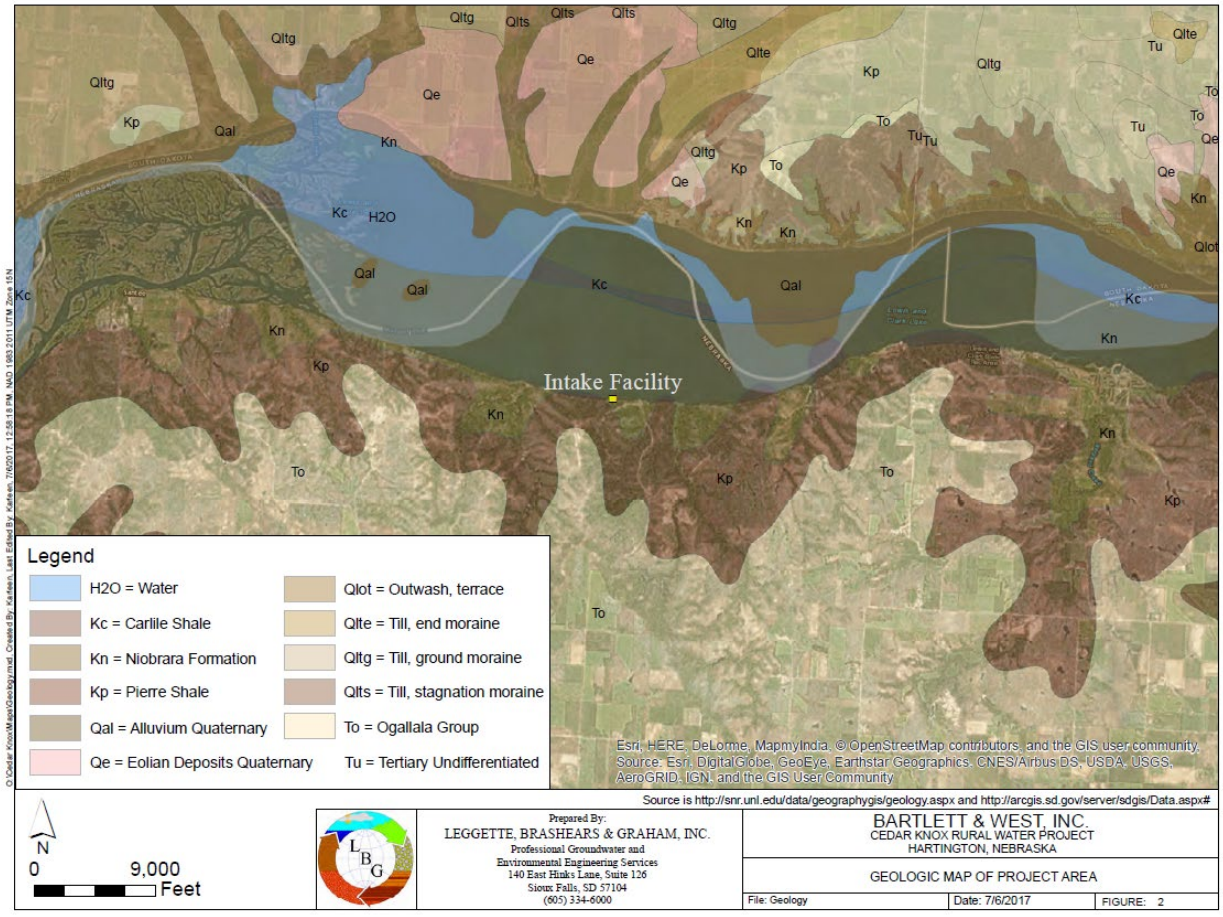

Figure 3. Geologic map of the near surface geologic units of the area near the intake in Lewis and Clark Lake in the Devils Nest region of Knox County

2. Advancement of the sediment leading edge has already resulted in higher levels of organic matter entering the intake requiring the increased use of chlorine to remove the organic matter. The increased chlorination results in elevated production of Safe Drinking Water Act (SDWA) regulated disinfection byproducts as regulated by Title 179 in Nebraska https://dhhs.ne.gov/Pages/Title-179.aspx. CKRWP is under an Administrative Order (AO) from the Nebraska Department of Environment and Energy (NDEE) to address one of these byproducts, Total-Trihalomethanes (TTHM).

Development of TTHMs that exceed the maximum contaminant level (MCL) set by the Environmental Protection Agency (EPA) and NDEE of 0.080 mg/L for the four-quarter running average initially resulted in issuance of violations to the regulations governing public water supply systems, Title 179. When the problem persisted, an AO was issued which requires action to return the system to compliance and to identify and implement a long-term solution.

3. Production capacity of the treatment plant and capacity in portions of the distribution system are at, or near, their maximum sustainable levels. In addition, areas of the distribution system infrastructure require updates or additions including line replacement, upsizing and improvements, water tower replacement, and other needs.

The need to meet current and future demand prompted the initial investigation and consideration of modifications to the water treatment plant and distribution system in 2016 (Attachment D.). Shortly after completion of the initial investigation the above referenced AO was issued due to the disinfection byproduct, TTHM, present at levels that exceeded the MCL. Additional investigation followed in 2017 to evaluate the capability of the intake structure in the Lake and associated equipment/piping to meet increased capacity via the existing water treatment plant and distribution system. The 2017 PER also investigated other alternatives to address TTHM production and capacity (Attachment E.). Many of the long-term and short-term concerns facing CKRWP have a direct connection to the encroaching sediment in the Lake.

CKRWP has proactively contemplated an exhaustive list of alternatives to providing a safe and reliable water supply and treatment system for the customers, including 1) relocation of the intake in the Lake and water treatment plant expansion, 2) development of a new intake and water treatment plant on the Missouri River downstream of Gavins Point Dam, 3) purchasing finished water from Yankton, SD, 4) developing a groundwater source in the Missouri River Alluvium with a water treatment plant downstream of Gavins Point Dam near Aten, NE, and 5) developing a groundwater source in Dolphin Township of Knox County with a water treatment plant. Consideration resulted in the CKRWP Advisory Committee unanimously deciding to pursue development of option 5) to develop a groundwater source in Dolphin Township of Knox County and to treat the water as needed with a new water treatment plant. New transmission lines will be required to bring the well water to the new plant and to connect the new plant into the existing system. Additional upgrades to the distribution system are necessary to address aging infrastructure and/or capacity in areas of the system with significant growth and development.

There are two proposed well fields located in an area of Dolphin Township in Knox County where further investigation and well development will occur in both a sand and gravel aquifer and the Ogallala Aquifer. The two (2) well fields are located approximately eight (8) miles from the proposed treatment plant location and will require a combined ten and one half (10.5) miles of pipe to reach the treatment plant location. The treatment plant is eight (8) miles south and east of existing system main lines. The

water from the wells will be piped to the proposed water treatment plant location and then, once treated for hardness, nitrate and/or manganese, tied directly into existing and/or new lines and pumped directly to customers or to storage facilities throughout the system.

With the preliminary engineering evaluation completed for option 5 and co-sponsor support secured, CKRWP is prepared to begin the preliminary design stages, including the hydrogeologic study, of the project. The design, permitting, bidding, and award of the construction contract is anticipated to be completed by late spring or early summer of 2023. Construction of the well fields, water treatment plant, and water supply system components is anticipated to be completed by the end of 2026, to match requirements of American Recovery Plan Act (ARPA) funding and to ensure capacity needs are met as soon as possible.

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

Field investigations completed as part of the preliminary engineering evaluations are described below:

- A preliminary engineering report (PER) was completed by Bartlett and West (B&W) in 2016 to evaluate expansion at the CKRWP water treatment plant (Attachment D.).

- A PER to evaluate the potential to relocate the intake structure in the Lake was completed by B&W in 2017 (Attachment E.). The PER also evaluated alternatives to address TTHM production, mitigate sediment encroachment, to increase capacity, and to address needs in the distribution system. This document was updated to include groundwater information at the request of the CKRWP Advisory Committee.

  The 2017 B&W PER included a Geologic and Hydrogeologic Evaluation of the Devils Nest area by Leggette, Brashears and Graham, Inc. (Attachment F.).

- Aero Electro-Magnetic (AEM) surveys were conducted in 2018 (WSF#5189 with supplemental LCNRD local out-of-pocket funding beyond the approved 40% grant match), in areas where groundwater source potential was identified as being high, based on known conditions, background information collected through routine irrigation water sampling, test hole data, monitoring well data, and regional knowledge. Six (6) sites were investigated using AEM surveys. The data collected provided insight for University of Nebraska Lincoln – Conservation and Survey Division (UNL-CSD) into where to complete test holes to further evaluate the potential of each surveyed area.

  AEM survey is a very rapid and efficient way of remotely sensing geology across an entire site without engaging in extensive drilling. In AEM surveys, a

geophysical device (typically bullet or hoop-shaped) containing sensors is suspended beneath an aircraft (can be helicopter or fixed-wing). An electromagnetic field is continuously transmitted to the land surface (and subsurface) while the aircraft is in flight and the sensors carried under the aircraft receive the subsequent return of electromagnetic energy from the land surface http://enwra.org/projects.html.

- UNL-CSD conducted groundwater investigation following review of the AEM Survey including drilling of test holes, sampling and logging the geologic material of each test holes, and designing and constructing observation wells at five target areas underlain by aquifers across the CKRWP service area in 2019 through 2021. The objectives were to establish background water quality and quantity data for groundwater management in the Lewis and Clark Natural Resources District (LCNRD) and to identify potential groundwater sources of sufficient quality and quantity to meet the needs of the Cedar Knox Rural Water Project. The data and summary of conditions was provided to engineers B&W and LRE. The presentation provided by UNL-CSD reporting the findings from the investigation is provided in https://www.dropbox.com/s/68gjzs8fa4h3n7q/ATTACHMENT%20M.%20-%202021%2C%20UNLCSD%20-%20Lackey%20presentation%20to%20CKRWP.pdf?dl=0.

- A hydrogeological review of two identified groundwater sources was conducted by LRE in 2021 The findings of that hydrogeologic review were utilized during the water supply well feasibility evaluations to determine anticipated water supply conditions. The final B&W 2021 PER includes LRE's findings and includes updates to address TTHM production and capacity of the distribution system (Attachment C.).

Field evaluations planned as part of the design process are described as follows:

- Hydrogeologic conditions will be further investigated (test hole drilling, design and construction of observation and test wells, extended period test pumping, and raw water sampling) to further evaluate the Quaternary-age buried sand and gravel aquifer and Tertiary-age Ogallala Aquifer, and to design a public water supply (PWS) wellfield that will have the potential to meet a demand of 1.5 million gallons per day (MGD).

- Source water conditions will be evaluated to determine proper design for the well design, pumping needs, water treatment equipment/process, and other needs based on those evaluations.

- Soil borings will be completed in areas where new construction is planned for the water treatment plant, storage tank, and transmission lines. These soil borings will allow the soil conditions at these locations to be evaluated to determine structural design criteria for these facilities.

- Soil evaluations will also be completed as necessary in areas where significant modifications to the distribution system will be made including locations where water lines and storage tanks will be upsized or replaced.

- Geotechnical evaluation of the Water Treatment Plant and lagoon locations will be completed.

- Evaluation of groundwater quality and water treatment needs will be completed as part of the water treatment plant design.

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

CKRWP relies on Lewis and Clark Lake as a surface water source. The intake, water treatment facilities, and initial storage tanks are located in the Devils Nest region of Knox County, see service area map in Figure 1 (page 11). The long-term feasibility of the Lake as the source for drinking water is addressed in the 2016, 2017, and 2021 PERs completed by B&W.

According to Cowman, (Cowman, Tim, 2013 Lewis & Clark Illustration Project, Missouri Sedimentation Action Coalition, USD Missouri River Institute, Vermillion, SD) the average rate of downstream delta front migration is approximately 400 feet per year, although during periods of high flow, it can advance much more rapidly. The advancement was approximately 4,800 feet in 2011 due to Missouri River flooding. Sediment in the Lake is represented in Figure 2. (page 12). Flooding in 2019 also significantly advanced the sediment delta although an estimate as to how much advancement occurred has not been made publicly available as far as is known by CKRWP and LCNRD. See Attachment H. for the most recent update on sediment progression by USACE to MSAC. The advancement of sediment threatens the security of the CKRWP intake which is situated on bedrock that makes up the lake bottom in the area of the Devils Nest. Advancing sediment will impact the capacity of the intake over the next two decades or less due to the variability of advancement. The bedrock surface eliminates the possibility of moving the intake or placing a collector well in the Lake to increase capacity as the structure would be subject to the sediment encroachment, just as the current intake, (see Attachment E. and F.) which would result in minimized, unpredictable pumping potential. The proximity of the bedrock to the land surface, due to the action of glaciers, also results in limited sand and gravel aquifers being present in the area near the current treatment plant. A geologic map of the near surface geologic units of the area near the intake in the Lake in the Devils Nest region is provided in Figure 3. (page 13). Locating a groundwater well with water availability and quality to meet CKRWP needs is also extremely impacted by the lack of aquifer material in the area. In addition to limiting intake placement and future use and well potential in the Devils Nest region, the nature of the geological setting also resulted in the loss of treatment plant lagoons, constructed to handle backwash discharge. The lagoon construction failed, and they slid down the hill in the mid-2000s. If CKRWP were to

make modification to increase capacity and update the existing treatment plant in the Devils Nest, an NDEE approved plan to manage the backwash would need to be identified.

CKRWP initially contracted with B&W to investigate solutions to the production capacity from the water treatment plant in 2016. The recommendations of that investigation included ensuring security of the intake for the long-term. In 2017, CKRWP again contracted with B&W to investigate options to secure the existing intake or to secure an alternative source. In addition, the 2017 study included consideration of methods/treatment to mitigate production of TTHMs to identify a long-term solution for the AO issued by NDEE in March 2017. TTHMs are a disinfection byproduct created from the interaction of chlorine with organic matter in the water source. Mitigating production of TTHMs is a high priority when considering the best source for CKRWP long-term service. As the sediment plume advances to the CKRWP intake more organic matter is carried, suspended in the source water, and is drawn into the intake which requires increased chlorination to effectively treat the organic matter present.

Following the 2017 B&W PER, CKRWP contracted with B&W to include groundwater sources in the PER as an alternative source to solve the production of TTHMs, secure a long-term source, and to address production capacity. In order to effectively represent groundwater options, Eastern Nebraska Water Resources Assessment (ENWRA) and the University of Nebraska Conservation and Survey Division (UNL-CSD) were engaged to facilitate and evaluate AEM surveys and hydrogeologic investigations of potential groundwater sources as detailed below.

In 2010, the LCNRD contracted Olsson Associates to more accurately define the hydrogeology beneath the LCNRD using all existing data. The Source Solution and System Upgrades project was initiated to assist the NRD with adaptation and development of groundwater monitoring and educational programs. Figure 4. (page 19), represents the depth to bedrock across LCNRD with shallow depth to bedrock represented in red and deeper buried bedrock in green. Areas where white hatch marks are present indicate that bedrock is at or near the land, which indicates less likelihood for there to be sand and gravel aquifers present. The service area of CKRWP (Figure 1. page 11), as a general rule, correlates with the aquifer absent area. The service area also generally exhibits less than ideal conditions for groundwater development. Water quantity in the service area is highly variable due to the historic action of glaciers in eastern Nebraska. Water quality is also highly variable with varying concentrations of constituents that are categorized as primary or secondary contaminants in the areas where groundwater resources are present in quantities sufficient to meet system needs.

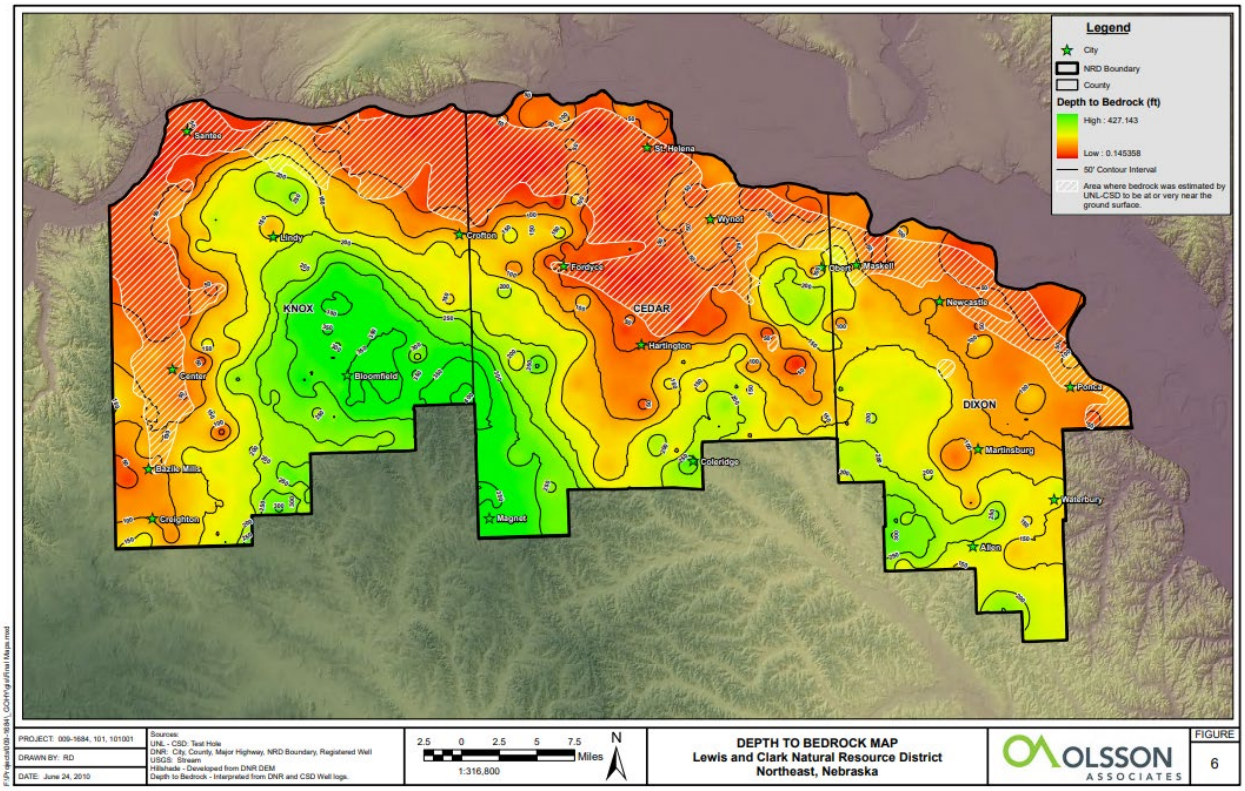

Figure 4. LCNRD - area of aquifer absent and depth to bedrock

The extensive development of irrigation and the necessity to locate a water source for CKRWP prompted LCNRD in 2018 to conduct Aero-Electromagnetic (AEM) surveys in six (6) areas of the district to obtain background aquifer data and to evaluate aquifer potential, Figure 5. AEM survey is a geologic investigation method that is described on the ENWRA website as follows. “AEM survey is a very rapid and efficient way of remotely sensing geology across an entire site without engaging in extensive drilling. In AEM surveys, a geophysical device (typically bullet or hoop-shaped) containing sensors is suspended beneath an aircraft (can be helicopter or fixed-wing). An electromagnetic field is continuously transmitted to the land surface (and subsurface) while the aircraft is in flight and the sensors carried under the aircraft receive the subsequent return of electromagnetic energy from the land surface.”

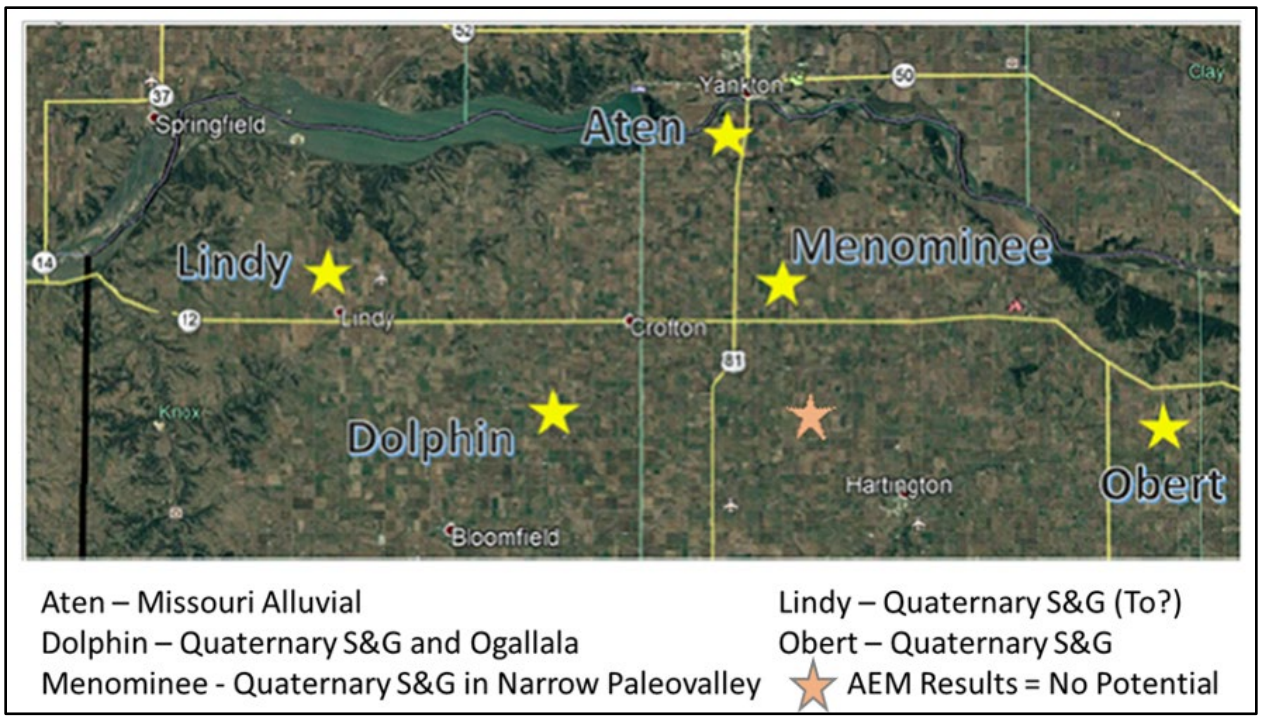

Figure 5. Target areas identified as potential locations to develop a groundwater supply for CKRWP

The resulting AEM survey data was utilized by CSD to identify specific locations for onsite test-hole drilling, observation well installation, and monitoring of water level and chemistry at five (5) of the six (6) target areas evaluated utilizing AEM surveys (Figure 5.). In 2018, CSD developed a preliminary groundwater system assessment using existing test-hole and observation well network data to determine area-specific data required. By the end of 2020, 24 test holes, 5 observation wells, numerous water sample tests, and some water level measurements had been completed as part of the ongoing groundwater investigation. At this time an interim assessment was needed by CKRWP engineers to complete the required PER that included development of a groundwater source. Therefore, an updated assessment of the groundwater flow system was performed by CSD, Table 3. (page 21), and all data was provided to B&W. These interim results indicated that the aquifers beneath the Dolphin and Aten areas had the best potential to produce the desired volume of water for the CKRWP. However, both areas warranted additional field investigation.

Table 3. CSD Hydrogeologic Investigation; preliminary and interim assessments.

Target Area	2018 Preliminary Groundwater Assessment	2020 Interim Groundwater Assessment
Dolphin	Good volume potential but may require special well screen settings due to high nitrate in sand & gravel.	Two Possible Sites: Northwest and Southeast Northwest; Moderate volume potential and nitrate concentration is low in both aquifers. Southeast; low to moderate volume potential and elevated manganese levels to north. South portion of the property needs investigated.
Aten	Good volume potential but water quality questionable due mainly to iron and manganese.	Good volume potential particularly if a collector well is installed; however, well design must consider surface water connection. Alluvial aquifer water is very hard, manganese levels are very high, and both nitrate and sulfate levels need to be further investigated.
Menominee	Good volume potential and nitrates are low but narrow target with well interference potential.	Good to moderate volume potential, possible elevated manganese, paleovalley difficult to pinpoint, and concern with location of oil pipeline.
Lindy	Possible low volume due to limited extent of the aquifer and unknown water quality.	Likely low to moderate volume due to limited extent of the aquifer and possible elevated nitrate levels.
Obert	Good volume potential in areas but unknown quality and long distance from large water mains.	Good volume potential but unknown quality due to delay of observation well installation.

2021 field investigation included additional test holes, wells, and water quality and level monitoring at the Aten area. The nitrate concentration of water samples from both wells were less than 1 milligram per liter (mg/l) at the new location; however, the sulfate levels were more than twice the suggested level and the hardness was reduced but still above 900 mg/l. The 2021 test hole drilled on the southern portion of the Dolphin Southeast site penetrated considerably more sand and gravel; therefore, a 6-inch test well was constructed, and both a step-drawdown and a constant rate pumping tests with water sampling were performed. The test well was pumped at 300 gallons per minute (maximum pump output) for 8-hours and the water level stabilized after 5.5 hours with a drawdown of about 7 feet. Table 4., outlines the laboratory results of the water sample obtained after 7.5 hours of pumping. These results of the were provided to LRE and B&W in November 2021. The presentation provided by UNL-CSD reporting the findings from the investigation is provided in https://www.dropbox.com/s/68gjzs8fa4h3n7q/ATTACHMENT%20M.%20-%202021%2C%20UNLCSD%20-%20Lackey%20presentation%20to%20CKRWP.pdf?dl=0

Table 4. Laboratory results of last sample obtained during 8-hour constant rate pumping test.

Well	NO3	Ar	U	Se	F	Na	Fe	Ca	SO4	TDS	Mn	pH	Cl	Hard
MCL MCL	10 mg/L	10 ug/L	30 ug/L	50 ug/L	4 mg/L	n/a mg/l	300 ug/L	n/a mg/l	250 mg/L	500 mg/L	50 ug/L	6.5 - 8.5	250 mg/L	n/a mg/l
31 TW	3.92	4.35	10.2	20.9	0.28	19.4	< RL	139	207	661	1.73	7.18	2.72	480

Ultimately Dolphin Township in Knox County was recommended by B&W and LRE as exhibiting the best potential for development as the source for CKRWP. The top reasons for the recommendation of Dolphin Township over the Aten area (the second most viable groundwater location) included the lower manganese and hardness levels from the Dolphin sites and less variable water quality due to the nature of the groundwater supply vs the likely surface water connection in the Aten area. The Aten site would require significantly more treatment and due to the probable higher levels of organics in the raw water supply, which will in turn require more chlorine thus increasing the levels of TTHMs produced in the finished water supply. The pros and cons of the Dolphin and Aten sites are listed in Table 5. from the 2021 PER (Attachment C.).

Table 5. Pros and cons of the Dolphin Site and Aten Site

Site	Pros	Cons
Dolphin (East Side)	Good saturated aquifer thickness and extent defined over most of the area	Additional test hole drilling and deeper aquifer to target other production wells
	Initial testing shows very good quantity	More testing needed to define aquifer characteristics at higher rates
	Low nitrates in vicinity of Test Well	Potential for nitrates to increase over time
	Low hardness compared to Aten	Elevated manganese levels
	Aquifer is less vulnerable to surface contamination with overlying till	Vulnerable area to the west near West Bow Creek Potential for well interference
	Appears higher nitrates to the west may be moving north-northeast	Need to verify groundwater flow direction
	Demand can be met with three wells	
Aten	Shallow aquifer less costly to construct	Highly vulnerable to surface contamination
	Recharge source from Missouri River	Potential for GUDISW
	Potential for high yields similar to Dolphin	No existing aquifer test data
	Vertical well option is less expensive to develop compared to Dolphin	High nitrates, manganese, sulfates, and hardens
		More investigation required to target well sites and design well field
		Appears four to five vertical wells may be needed to meet demand pending aquifer thicknesses and well field design

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

Land rights are required for the well field locations and the plant location as indicated in Table 6. and Figure 6. Purchase agreements are in place for the two proposed well locations. A site and price have been established with a willing landowner for the treatment plant. The cost for land acquisition is included in the request for funding. Easements will be obtained following the design phase of the distribution system and water treatment plant.

Table 6. Land Right Needs

Land Right Need	Legal Description	Approximate Acres
Well Field 1	Sec. 26 -T31N-R2W	5 acres
Well Field 2	Sec. 8 -T31N-R2W	5 acres
Treatment Plant	Sec. 22 -T32N-R2W	40 acres

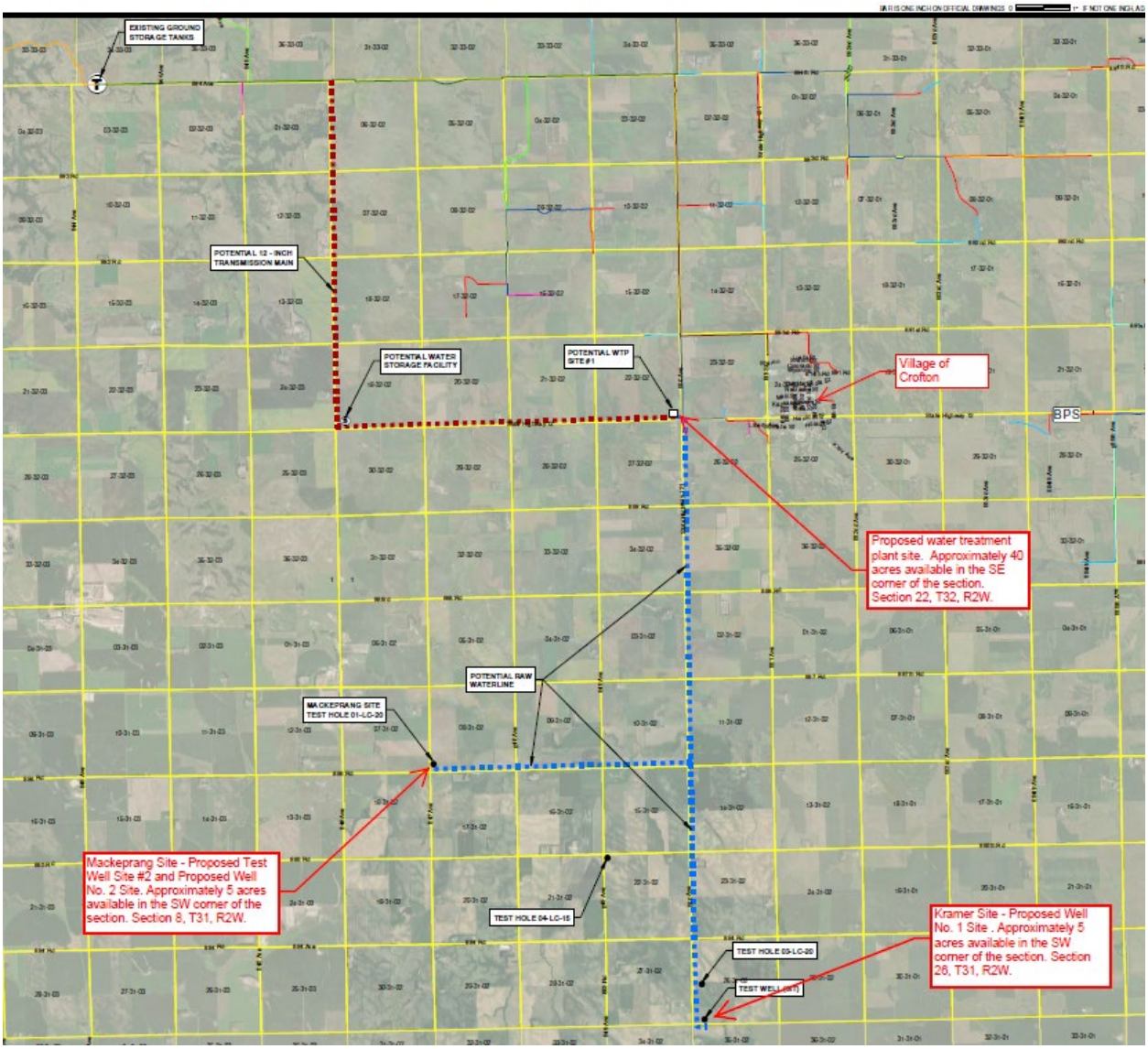

Figure 6. Proposed well fields and water treatment plant locations in Knox County

Easements will be required along the proposed new water transmission main locations as illustrated in Table 7. and Figure 6. Line locations may vary depending upon the ability to install the line in the right of way (ROW) or on private property. There are approximately ten and one half (10.5) miles of new transmission line to be installed between the wells and the plant and eight (8) miles of new transmission line from the new plant to the existing distribution system. See Attachment I. for a listing of the easement needs for new construction.

There are approximately twenty-four (24) miles of line to be upgraded or replaced. The majority of the new and updated installation will occur on private property with the remainder in the Knox County or Nebraska Department of Transportation (NDOT) ROW. Easements are held by LCNRD in locations where lines will be upgraded to meet demand needs and/or to provide redundancy as represented in Table 7. and

Attachment J. LCNRD management certifies that the easements are held and are available for review upon request.

Table 7. Easement Needs

NEW Easement Need	Description	Approximate Feet
From Well Field 1 to Treatment Plant	12 inch PVC running north parallel to 550 Ave.	39,600 feet
From Well Field 2 to Treatment Plant	12 inch PVC running east parallel to 886 Rd.	15,840 feet
From Treatment Plant to existing Distribution System	12 inch PVC running east parallel to Hwy 12, then north along 546 Ave. connecting at 894 Rd.	42,240 feet
Updates to Existing Easements to facilitate Upgrades to Existing Distribution System	Varying pipe sizes along 895 Rd., 553 Ave., 897 Rd., 554 Ave., 555 Ave., Hwy 121, 549 Ave., 897 Rd., Esther St., Oak Ridge Rd., others	126,720 feet

CKRWP does not anticipate significant resistance to the occupancy of public right of way along the proposed water line construction locations. CKRWP will engage with private landowners on a case-by-case basis in order to save on overall project costs. However, if necessary, LCNRD possesses condemnation authority to acquire needed right-of-way for the project per Neb. Rev. Stat. § 2-3233 and §2-3234. A letter from the CKRWP ensuring that all necessary additional land rights will be acquired is included in Attachment A.

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

There are three major components to the final plan:

1. Develop a groundwater source to replace the at risk, surface water source from Lewis and Clark Lake.

    a. Two well fields will be developed in Dolphin Township of Knox County. Testing of the well fields will be conducted as detailed in Section B.- 1.A.7 of this application.
        i. Water quantity will be evaluated to determine potential long-term and short-term impacts to neighboring wells and to ensure supplies meet need for CKRWP.
        ii. Water quality testing will be conducted to evaluate potential pumping impact on quality over the longer-term.
        iii. Water quality testing will also determine treatment needs.

2. Construct a groundwater treatment plant located near the groundwater well fields in Dolphin Township of Knox County.

3. Complete distribution system improvements and expansion to include:

    a. new construction to bring the new wells and water treatment plant on-line,
    b. address areas of increased demand in the area of development along the Lake, the Missouri River, and other locations identified in the 2021 PER, by
        i. upsizing of existing lines,
        ii. adding new lines to provide redundancy and increase availability in areas where increasing line size is not sufficient to meet need,
        iii. and replacing a water storage tank.

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

Completed Investigations

Research and field investigations utilized to substantiate the project include the following:

a. Geologic and Hydrogeologic Investigation of the Cedar Knox Rural Water Project by Leggette, Brashears, and Graham, Inc. completed in 2017 evaluating the suitability of a horizontal collector well to serve as a future water supply.
b. AEM survey of the district- 3-mile grid and focus flights that benefit the district and evaluation of potential groundwater sources for further investigation.
c. All historic and recent test hole data from UNL Conservation and Survey Division.
d. Site specific test holes were completed in areas of investigation to define geologic/hydrogeologic conditions and to better identify areas for potential development.
e. Developed observation wells to evaluate water quality and initial quantity potential.
f. Designed and completed a test well on one of the planned well field sites.
g. Desktop reviews were performed using National Elevation Data Sets (NEDs) incorporated into a GIS database to evaluate the system hydraulics for the proposed project which included sizing of proposed waterlines, water storage tanks, and high service pumping facilities.

Planned Investigations

A geotechnical evaluation of the water treatment plant site, the water storage tank site, and other facilities requiring structural design will be conducted during the design phase to provide site specific design information. Topographic site surveys will also be completed prior to design at these facilities to allow for detailed site plans to be produced.

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

Completed Investigations

Six (6) areas underlain by aquifers identified as having potential to serve as a source for the CKRWP were identified. Airborne electro-magnetic (AEM) surveys were performed over these areas to define aquifer boundaries and target optimum locations that could provide a sustainable source for the CKRWP. Evaluation of each aquifer to define water chemistry and saturated thickness was completed between 2019 and 2021. Test-hole drilling, borehole logging, observation well installation, and monitoring of water level and chemistry was conducted, and provided to CKRWP engineers for inclusion in the 2021 PER.

Two (2) groundwater source locations were identified for additional investigation, one in the Missouri River Alluvium near Aten, NE and one in Dolphin Township of Knox County, NE including two well field locations where both sand and gravel units and Ogallala Group materials will be developed. Observation wells were installed, and water quality and quantity were tested based on previously defined concerns at each site. Desktop evaluations and recommendations were completed by the UNL-CSD Hydrogeologist and LRE Hydrogeologist. UNL-CSD completed test hole investigations and provided recommendations which were further analyzed by LRE and are included in the 2021 PER prepared by B&W. The results of this analysis are included in Attachment C. Final determination was to pursue the proposed well field locations in Dolphin Township.

Planned Investigations

Additional investigation will be required of the two specific sites in the Dolphin Area. This will include hydrologic analysis of these sites including drilling additional test holes, sampling and logging of the geologic material, designing and constructing both observation and large diameter test wells, and extended period test pumping tests with raw water sampling.

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).

Design of the groundwater supply system and distribution system will meet the requirements and design criteria of the following design standards:

- Nebraska Department of Environment and Energy (NDEE) Regulations Governing Public Water Supply Systems – Title 179 NAC2.
- Great Lakes Upper Mississippi River Board of State Health and Environmental Managers Recommended Standards for Water Works (Ten State Standards).

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

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

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

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

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

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). NA

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.

CKRWP contracted with B&W to evaluate options available to increase capacity and to meet demand needs of 1.2 to 1.5 million gallons per day (MGD) to its customers. Attachment C. The report documents the pros and cons of a number of alternatives as indicated below.

1. Relocate the raw water intake in Lewis and Clark Lake and expand the existing water treatment plant.
2. Develop a new surface water intake and water treatment plant on the Missouri River downstream of Gavins Point Dam.
3. Purchase finished water from Yankton, SD.
4. Develop a groundwater source in the Missouri River Alluvium with a new water treatment plant downstream of Gavins Point Dam near Aten, NE
5. Develop a groundwater source in Dolphin Township of Knox County or Aten Area of Cedar County with a new water treatment plant.

Based on information documented in the PER, the next best alternative considered by the CKRWP Advisory Committee and LCNRD Board of Directors to secure a long-term water source for CKRWP was to connect to the City of Yankton, South Dakota water system. The initial cost of connecting to another system would have less up-front capital expense than developing a groundwater source. However, the cost to the system and customers would not be in the long-term interest of CKRWP due to the assumed annual average rate increase of purchasing water from Yankton, SD. This annual water rate increase of 3.0% was provided by the seller and was used to perform the cost analysis.

Figure 7. represents the present value cost per 1,000 gallons purchased or produced over a 50-year period. See Attachment K. for the supporting life cycle analysis information used to develop Figure 7. It can be seen in the figure that purchasing water from Yankton, SD would soon become the most expensive of all the options considered.

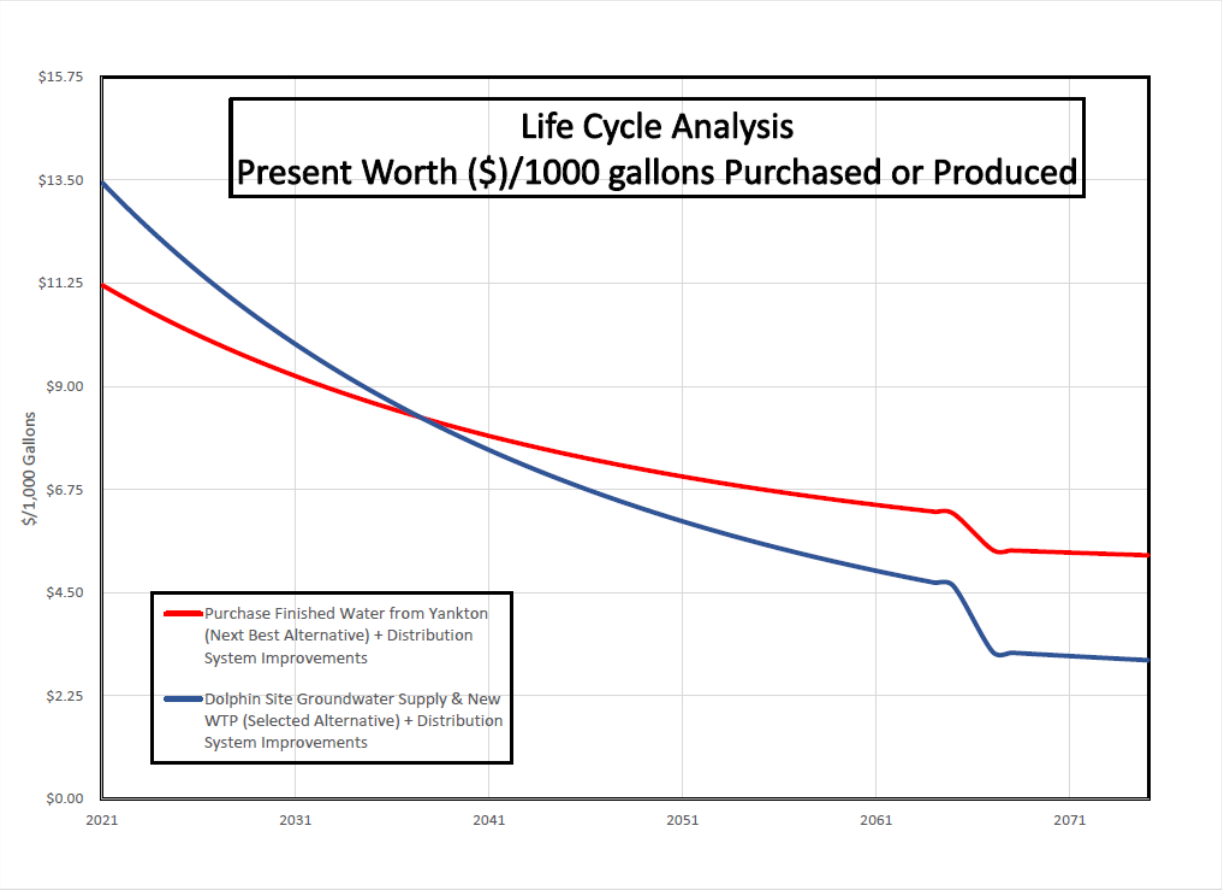

Figure 7. Present Worth - Cost Per 1,000 Gallons Purchased or Produced

CKRWP's existing source water supply and treatment plant are located in a remote area of Knox County including a surface water intake in the Lake. The intake is subject to sediment encroachment and flooding impacts.

The CKRWP Advisory Committee and LCNRD Board of Directors also considered another groundwater source located in the Missouri River Alluvium near Aten, NE. This source exhibited benefits not realized by the selected source in Dolphin Township of Knox County. The benefits included proximity to existing water lines, ability to discharge waste water from production directly into the Missouri River and production of a final product that is similar to the current drinking water provided to customers. However, because of the highly variable deposition of aquifer materials in the area and the levels of iron and manganese concentrations present in the Missouri River alluvial aquifer this option was deemed less feasible than proceeding with groundwater sources in Dolphin Township of Knox County. A hydrogeological investigation was conducted by UNL-Conservation and Survey Division and further by LRE to evaluate the two identified

groundwater resources and to evaluate the potential costs of water treatment. The hydrogeological investigation concluded that new water supply wells should not be anticipated to produce meaningfully higher water quality than the existing water supply.

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).

Economic feasibility was reviewed as described in Title 261 – Rules Governing the Administration of the Water Sustainability Fund. The period used for this economic feasibility analysis was 50 years pursuant to the guidelines of this application. The proposed design of a new long-term groundwater supply, water treatment plant, and distribution system upgrades for CKRWP will provide a secure source of drinking water for the 50-year design life.

Without the Source Solution and System Upgrades project the CKRWP intake located in the Lake will be inundated by sediment causing, at a minimum, severe restriction to the amount of water that can be drawn for treatment and therefore severely limit the finished water that can be delivered to customers. Ultimately the restricted water source potential would leave CKRWP unable to supply water to its users. In addition, CKRWP would be required to identify an alternative solution to satisfy the AO issued due to production of the disinfection byproduct TTHM in excess of the SWDA MCL. Resolving the AO through methods other than a source water change would not solve the ultimate problem facing CKRWP with encroaching sediment that carries the organic matter into the system and which will restrict the water supply.

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).

A description of the project costs of construction and the timeline for completion of each element of construction is presented in Table 8. below. Annual O&M is estimated to be $850,000 per year (Table 8. below reflects increase to O&M only to show benefit over current O&M costs over 50 years).

Table 8. 50-Year Project Cost Estimate

Task	Year 1	Year 2	Years 3&4	Year 5-50	Total $
	2023	2024	2025-2026	2027-2072	Amount
Engineering, Design, Bidding, and Construction Admin Services	$350,000	$185,000			$535,000
Engineering Design and Construction Admin Services for WTP, Wells, and Transmission Facilities	$1,150,000	$500,000	$500,000		$2,150,000
Permitting	$20,000	$5,000			$25,000
Other Professional Services (legal, fiscal, administrative, etc.)	$375,000	$225,000	$150,000		$750,000
Land Easement Acquisitions	$1,000,000	$450,000	$450,000		$1,900,000
Well Field Development	$654,000	$1,676,000			$2,330,000
Water Treatment Plant Construction, Piping, Tank & Observation	$3,440,000	$10,000,000	$4,500,000		$17,940,000
Distribution System Construction	$3,500,000	$2,000,000	$870,000		$6,370,000
Totals	**$10,489,000**	**$15,041,000**	**$6,470,000**	**$0**	**$32,000,000**
Net Increase to Operation and Maintenance Cost ($26,350 per year increasing 3.1% per year)				$2,611,924	$2,611,924
TOTAL 50-YEAR PROJECT COST					**$34,611,924**

LCNRD is requesting financial support from the Water Sustainability Fund for the design, permitting, and construction of the long-term water supply system for the Cedar Knox Rural Water Project to convert from the surface water source in Lewis and Clark Lake.

CKRWP will not be able to maintain production capacity or meet Administrative Order (AO) requirements for the long-term due to encroaching sediment in the Lake impacting the ability to draw sufficient water, to minimize the impact from disinfection by-product development, and to construct a plant to meet current demands of CKRWP.

A net annual O&M increase of 3.1% is included to account for increases in labor costs, power, chemicals, and administrative expenses. Detailed information regarding project costs is provided within the 2021 PER (Attachment C.).

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).

Tangible Benefits

Tangible benefits are provided in Table 9. below (inference between Attachment L. and K.).

Table 9. 50-Year Project Benefit Estimate

Task	Total $ Amount
Purchase finish water from Yankton (next best alternative) plus distribution system improvements	$83,895,185
Dolphin site groundwater supply and new WTP (selected alternative) plus distribution system improvements	$73,273,514
Totals 50-yr Project Benefit	$10,621,671

In 2017 CKRWP engineering firm, B&W evaluated the feasibility of options to address source security, TTHM production and AO, and methods to increase capacity for the system (Attachment E). In 2021, CKRWP again contracted with B&W to expand the evaluation of the options identified in 2017 to include groundwater sources as options to address system needs (Attachment C.). Between the two studies five (5) options were considered to provide a water source for the future of the Cedar Knox Rural Water Project (CKRWP). Not all of the options considered in the 2017 PER were carried forward to the 2021 PER as they were eliminated as viable options by the CKRWP Advisory Committee following the 2017 PER completion. The options evaluated included:

1. New Intake and Expansion of Existing Water Treatment Plant
2. New Surface Water Collector Well & New WTP (South Yankton)
3. Purchase Finished Water From Yankton, SD
4. Develop a Groundwater Well Field & WTP in the Missouri River Alluvium (Aten Site)
5. Develop New Ground Water Supply in the Ogallala Aquifer & WTP (Dolphin Site)

According to the 2021 PER, the best potential option was development of groundwater as a source to replace the surface water source in the Lake to address development of TTHM production, capacity, and long-term security (Table 10.).

Table 10. Evaluation Matrix for CKRWP Source Options

Option Description	Evaluation Criteria			
	Meets Demand	Reliability	Challenges	Estimated Project Cost
Option #1	No	Varying Water Quality	Access, Lagoon Location, & TTHMs	$14,700,000
Option #2	Yes	Varying Water Quality	TTHMs	$20,600,000
Option #3	Yes	Yes	Significant Cost of Water	$7,900,000 + Cost of Water
Option #4	Yes	Varying Water Quality	High Nitrates, Manganese, & Hardness	$18,500,000
Option #5	Yes	Yes	Potential for Nitrates to rise	$19,700,000

Table 3. (page 13) further defines the evaluation of source water options. The pros and cons for each option are detailed in the 2021 Bartlett and West PER (Attachment C). The key factors considered for each option are summarized below.

Option #1 - New Intake and Expansion of Existing Water Treatment Plant

Pros

- WTP location is placed correctly for the natural hydraulics of the system.

Cons

- Continued siltation of Lewis & Clark Lake
- Surface water quality promotes development of TTHMs
- No suitable location for WTP Lagoon
- Site is difficult to access for chemical deliveries
- Room for WTP expansion is limited

Option #2 - New Surface Water Collector Well & New WTP (South Yankton)

Pros

- Development of a Collector Well would ensure quantity of raw water.
- Good access to WTP site

- Centrally located on the north side of the existing CKRWP water system

Cons

- Surface water quality promotes development of TTHMs
- High levels of Nitrates, manganese, and Hardness in the raw water supply.
- High cost of collector well construction
- High flows of Missouri River could cause sediment concerns

Option #3 - Purchase Finished Water From Yankton, SD

Pros

- Significant reduction is O&M to CKRWP with the elimination of the WTP.
- Quality Finished Water

Cons

- No control over rapidly increasing water rates
- Based on cost of water growth rate provided by the seller, overall cost per 1,000 gallons will exceed all other options within 12 years

Option #4 - Develop Groundwater Well Field & WTP in the Missouri River Alluvium (Aten Site)

Pros

- Development of well fields within the Missouri River Alluvium will provide sufficient raw water.
- Location of WTP to the Missouri River will allow for discharge of RO waste stream directly to the river.
- Centrally located on the north side of the existing CKRWP water system.
- Should allow for good access to WTP Site.

Cons

- High levels of nitrates, manganese, and hardness in the raw water supply.
- Water quality potential variability can promote development of TTHMs
- High chemical costs to deal with excessive hardness in the raw water.

Option #5 - Develop New Ground Water Supply in the Ogallala Aquifer & WTP (Dolphin Site)

Pros

- Groundwater dramatically reduces the likelihood of Disinfection Byproducts forming in the water system.
- Sufficient quantities of raw water available.
- Lower levels of nitrates, manganese, and hardness make treatment options less complicated and less expensive.
- Centrally located on the south side of the existing CKRWP water system.
- Sufficient land available for adequately sized WTP Site and additional well development if needed in the future.
- Potential for additional water sales by constructing the WTP and transmission piping in this area.

Cons

- Potential for nitrate levels to rise over time.

- No ability to directly discharge production waste water to area tributaries so hauling of some lagoon sludge may be necessary.

The limitations of the options considered left the only other realistic options to be development of a source in the Missouri River Alluvium near Aten, NE which was not selected as an option due to the more complex aquifer conditions in the identified setting and existing across the aquifer in the region where the aquifer could potentially serve the needs of CKRWP. Otherwise connecting to the City of Yankton, SD was the next most viable option considered. Connecting to the City of Yankton, SD would result in long-term costs that significantly exceed those of developing a groundwater source.

If CKRWP would decide not to develop a long-term water source and instead continue with the Lake intake and upgrades to the current plant; NDEE has expressed that CKRWP would be required to complete an assessment to determine requirements for addressing lime solids discharge if the plant in the Devils Nest is to continue producing water for the long-term. Therefore, CKRWP would incur the cost of lagoon design and construction, facility upgrades to meet changing standards, plus routine maintenance costs of the lagoon which poses significant challenges due to steep grades and poor road conditions to access the plant location. Chemicals and equipment for the plant, when delivered by straight truck or semi-truck, are delivered to the office in Hartington instead of directly delivered to the plant because of the accessibility limitations. With the encroaching sediment CKRWP would need to relocate the intake within 20 years to avoid significant reduction in the ability to draw water for the system. Moving the intake north across the Lake or east in the Lake would, at best, delay the impacts of the sediment encroachment. If moving the intake in the Lake, the source of the water for production would remain surface water containing organic matter and the AO would still need to be addressed. Other distribution system upgrades would still be completed as planned with the development of new wells to address existing limitations within the system.

Intangible and Secondary Benefits

The current discharge of backwash resulting from the water treatment process is discharged into Birdsell Creek and introduces lime into the creek. These inputs can adversely affect the chemical and biological integrity of the stream. Eliminating this discharge would directly benefit surface water quality and aquatic life.

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 detailed annual cash flow breakdown over the 50-year life of the project is represented in Attachment L. The annual cash flow table includes the anticipated cash flow of the next best alternative, connecting to Yankton, SD. The CKRWP Source Solution and System Upgrades project has an estimated capital cost of $32,000,000 (2021$) with an O&M cost of $850,000 per year (2021$). The capital cost of connection to the City of Yankton, SD for water service is $17,500,000 (2021$) with an annual O&M

cost of $545,000 plus cost to purchase water of $559,821 (2021$, Attachment K.). Looking at these costs over the 50-year life of the projects the present cost value of pursuing groundwater is $73,273,514 while purchasing water from the City of Yankton is $83,895,185 (inference between details in Attachments L. and K.). Over the 50-year period, including operation and maintenance costs, converting to a groundwater source is the best alternative by approximately $10,621,672 below connecting to Yankton, SD.

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.)

While tangible benefits are able to be calculated for the development and treatment of a new water supply to maintain a functional water system, it should be noted that the risk of loss of safe and reliable water to the community in any given year is immeasurable. Without an improvement project, the existing intake in the Lake and water treatment plant are susceptible to the inundation by sediment and the related impacts. Continuing with the intake in the Lake will result in the eventual loss of water service and will present a significant public health and safety risk to the community.

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.

Neb. Rev. Stat. §§ 2-3252 through 2-3257 allows for establishment of improvement projects by NRDs and identifies the authority of NRDs to set customer rates, borrow money and/or issue bonds. The CKRWP Advisory Committee annually reviews customer rates to be charged and makes rate adjustments as needed in order to cover capital and operations and maintenance costs for the water system on an annual basis. The CKRWP Committee provides recommendations to the LCNRD Board of Directors which has authority to ratify the recommendations and implement changes to rates, borrow money, or consider bonding certain costs of providing water service.

An American Recovery Plan Act (ARPA) funding award in the amount $7.0 million has been designated for the Source Solution and System Upgrades project through action of the 2022 Nebraska Legislature in LB1014e Section 53. NDEE is the entity responsible for distributing the funds pertaining to this project. The NDEE Drinking Water State Revolving Fund (DWSRF) program administrators have indicated in the annual Intended Use Plan (IUP) as posted on the NDEE website here http://dee.ne.gov/Publica.nsf/PubsForm.xsp?documentId=8BC9BBC6723662488625873300779B6F&action=openDocument. hat funding will be provided for the project, of the total allocated $10.865 million is for loan forgiveness and the remaining amount is available for loan. NDEE is responsible for distributing DWSRF monies and will reimburse project expenses with receipt of eligible expenses. The amount not covered by ARPA and DWSRF is $14.135 million. CKRWP is requesting 60% of the remaining

$14.135 million from WSF which is equal to $8.481 million. CKRWP will utilize DWSRF loan or will issue bonds for all or part of the $5.654 million not covered by other sources.

Summary of Anticipated Funding Sources
$7 million – American Recovery Plan Act allocation
$10.865 million – State Revolving Fund (SRF) loan forgiveness
$8.481 million – Water Sustainability Fund
$5.654 million – Cedar Knox Rural Water Project – SRF loan or bonding
$32.0 million – Total Project Cost

In the instance, WSF funding is not realized as detailed above, CKRWP will consider seeking additional sources of grant funding or increase the DWSRF loan amount to complete the project. CKRWP is requesting $8.481 million from the Water Sustainability Fund for design, permitting and construction of the long-term water supply system.

If CKRWP were to obtain additional funding, the amount of funding requested from the Commission would be adjusted to reflect the additional funding brought into the project.

CKRWP's letter of financial commitment is included as Attachment A. of this application. NDEE administers ARPA funding for the project and the DWSRF program, and has endorsed the project through a Letter of Support, which is included as Attachment B.

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

LCNRD has accepted the obligation to provide drinking water to approximately 3,000 residents of northern Cedar and Knox Counties. LCNRD has the authority to establish water rates, to borrow money, and to bond, to cover the costs associated with providing safe, reliable, drinking water to customers of the system as stated in Neb. Rev. Stat. §§2-3252 through 2-3257. CKRWP has budgeted and will continue to budget sufficiently for operation and maintenance of the system.

NRDs are granted the authority to impose property tax levies to generate revenue for operational needs. The funding levies for the LCNRD will provide sufficient funds to provide the cash contribution necessary to repay reimbursable costs and cover OM&R not already covered by state and federal funds. The current tax levy for LCNRD is 2.7434 and the current valuation of property in LCNRD is $4,037,391,161. The budget forms which include budget information for both LCNRD and CKRWP are filed with the State of Nebraska are available for review on the State Auditor's website (https://auditors.nebraska.gov/Budgets_Filed/2022/Lewis_and_Clark_NRD_B2122.pdf).

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

CKRWP is planning to contribute $5,654,000 in local match through a DWSRF loan or potentially through issuing bonds. The portion of the project cost to be incurred by the

project will be recuperated through additional customer fees. The total $5.654 million will be paid back over the life of the project through an increase to the per 1,000 gallon rate and/or to the minimum fee charged to each customer.

CKRWP will review water rates on an annual basis to ensure sufficient annual revenue is produced to meet the financial obligations of the DWSRF debt service. CKRWP is committed to the Source Solution and System Upgrades project and will provide funding to meet the $5.654 million dollars to complete the project successfully. CKRWP's letter of financial commitment is included in Attachment A of this application. NDEE is responsible for administration of ARPA funding for the CKRWP Source Solution and System Upgrades project and administers the DWSRF program and has endorsed the project through a Letter of Support, which is included as Attachment B.

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

Development of a well field in Dolphin Township of Knox County, water treatment plant construction and discharge, and water line installation and improvements will have less impact on the natural environment than the current treated surface water source or the second-best alternatives of developing a well field in the Missouri River Alluvium or connecting to Yankton, SD where significant water production by-products will be discharged into the Missouri River.

The well field will draw similar quantities of groundwater of approximately five (5) irrigation wells pumping 800 to 1,000 gallons/minute. The well field will pump throughout the year as opposed to intensive summer pumping for irrigation. Although the most domestic use occurs in the summer and corresponds to the irrigation season, the use is considered less impactful to the resource than the intensive summer irrigation pumping demands. Domestic use during the off-irrigation season is also much lower.

There will be minimal effect on the natural environment during pipeline construction. Some of the open trench pipeline installation will be completed within public ROW or on crop ground which has previously been disturbed. The pipeline crossings of sensitive environmental features will be installed utilizing technologies to minimize environmental impacts whenever possible.

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

CKRWP was formed by LCNRD to serve drinking water to the service area in northern Cedar and Knox Counties, see service area map (Figure 1. page 11) aquifer CKRWP was established per Neb. Rev. Stat. §§2-3252 through 2-3257 and §2-3238 has an obligation to provide drinking water to approximately 3,000 residents receiving service in the project area in northeast Nebraska. CKRWP has the authority to operate a water system as per the Nebraska Department of Environment and Energy (NDEE) Water System Number NE3120303. LCNRD has the authority to borrow money, to bond, and

to establish water user rates to meet the costs associated with operating a water system also stated in Neb. Rev. Stat. §§2-3230 through 2-3242 and §§2-3252 through 2-3257.

The majority of the project will be located within privately owned property, County, or State right of way, where CKRWP has a legal authority to install infrastructure for the conveyance of water to its customers per Neb. Rev. Stat. §§2-3230 through 2-3242 and §§ 2-3252 through 2-3257. All necessary permits will be acquired to ensure all legal obligations of the project are fulfilled.

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

There are three (3) state-level plans the Source Solution and System Upgrades project will address, the NeDNR and LCNRD jointly developed voluntary IMP, the 2021 NeDNR Annual Report, and the Nebraska State Hazard Mitigation Plan.

Voluntary Integrated Management Plan (IMP)

The Lewis and Clark Natural Resources District voluntary IMP is jointly developed by the Nebraska Department of Natural Resources (NeDNR) and was adopted on September 5, 2016. Since adoption of the IMP, LCNRD has submitted biennial reports to NeDNR reporting progress toward the goals and objectives identified in the plan.

The purpose of the IMP is to attain and/or maintain a desired balance between water uses and water supplies of both surface water and groundwater sources. In this way, economic viability, social health, environmental health, public safety, and public welfare in the District can be better achieved and maintained. The voluntary IMP focuses on water supplies of the entire District and incorporates many aspects that mutually benefit other actions of the District. The specific goals and objectives the Source Solution and System Upgrades project supports are listed below:

> **IMP Goal 2:** Protect existing water uses while allowing for future water development.
>
> > **Objective 2.1:** Collaborate with local, state, and federal entities to better manage hydrologically connected ground and surface water.
> >
> > **Objective 2.3** Improve water resource sustainability through innovative management strategies.

The Source Solution and System Upgrades project provides benefits to the objectives of the IMP goal and objectives by protecting the existing uses established by LCNRD through the Cedar Knox Rural Water Project by securing an alternative groundwater source that will allow continued use of water while converting from the current surface water source. The design and construction phase of the engineering plan includes intensive testing to evaluate and protect existing domestic, stock, and irrigation uses when developing and designing the well fields and their pumping rates. The nature of a

rural water system pumping from a small number of wells to meet the needs of several thousand residents and to meet the demand of agricultural and recreational uses is an innovative strategy that minimizes the impact to smaller aquifer systems in an area where aquifers are diverse and limited in extent and quality. Figure 4. (page 19) represents the area of aquifer absent and depth to bedrock in LCNRD which correlates to the service area of CKRWP (see Figure 1. page 11).

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The NeDNR and project sponsors share many common goals that aid in the protection of water for agricultural, communities and industries, wildlife and the environment, and recreational users. If funded, the 3,000 residents in the project area will also benefit from those joint agency efforts.

The Source Solution and System Upgrades project supports strong state leadership and involvement on a state concern to effectively meet drinking water needs for residents. The decision-making process is fully supported by scientific data review to identify a sustainable local water source to meet local needs. Development of the groundwater source in an area where resources are poorly understood required significant scientific investigation using AEM survey, test hole drilling, and observation well development.

The Source Solution and System Upgrades project directly addresses flood mitigation by converting from the surface water source in the Lake to a groundwater source. The NeDNR survey and related services regarding floodplains and flood planning will be updated.

The project stems from collaboration between NeDNR, stakeholders and LCNRD/CKRWP to provide long-term sustainability of the water resource.

LCNRD has met with the residents directly impacted by this project and will be holding additional meetings with the residents and communities served and/or impacted (stakeholders) by the Cedar Knox Rural Water Project. Frequent interaction between LCNRD, CKRWP and the partners who are responsible for technical components of the project or provide expertise will be engaged frequently ensuring local and state needs are addressed.

The Source Solution and System Upgrades project would be a collaborative investment of multiple entities leveraging funds to secure an alternative groundwater source that will allow continued use of water while converting from the current surface water source. The design and construction phase of the engineering plan includes intensive testing to evaluate and protect existing domestic, stock, and irrigation uses when developing and designing the well fields and their pumping rates. Having a highly optimized rural water system pumping from a small number of wells to meet the needs of several thousand residents and to meet the demand of agricultural and recreational uses is an innovative strategy that minimizes the impact to smaller surrounding aquifer systems when compared to other potential land use developments. This is especially important in the

CKRWP area where aquifers are diverse and limited in extent and quality. Development of a Wellhead Protection Plan will identify further mechanisms to protect the sustainability of the resource. The public wells will also be registered with the NeDNR.

If awarded, the project will be part of the state-aid funds (WSF) in conjunction with the NRC that the NeDNR administers. Through that WSF contracting and reporting process, data will be shared with NeDNR (groundwater monitoring data, well field development quantity and quality analysis, compliance analyses), and the outcomes of the Project summarized to the public under the NeDNR WSF website.

Nebraska State Hazard Mitigation Plan

The Nebraska Emergency Management Agency (NEMA) implements the Nebraska State Hazard Mitigation Plan (SHMP). The purpose of the Nebraska State Hazard Mitigation Plan (2021) is to provide a comprehensive discussion of the natural, technological and human-caused hazards that present risks to the citizens, resources, and property of Nebraska along with identifying the state's objectives and commitment in reducing the risks and vulnerability from these hazards. The plan also serves to break the cycle of repetitive damage by coordinating the implementation of mitigation activities that eliminate or reduce the long-term risk to human life and property from hazards and their effects. An abbreviated summary of the plan's goals and objectives related to this project include:

Goal 2 – Reduce or eliminate long-term risk to property, including critical facilities and infrastructure, historic, and private property.

Objective 2.3 - Promote resilient and sustainable building to reduce vulnerabilities, encouraging the use of green and natural infrastructure, when appropriate.

Objective 2.4 - Identify opportunities to mitigate vulnerable critical infrastructure, such as utilities, roads and bridges, and other Lifeline-related facilities.

Goal 5 – Build stronger by promoting mitigation actions that emphasize sustainable construction and design measures to reduce or eliminate the impacts of natural hazards.

Objective 5.1 - Encourage building and rebuilding practices that address resiliency through higher standards and sustainable design to resist impacts of natural hazards.

Objective 5.2 - Enhance coordination with state and local agencies that promote resiliency and sustainability.

The conversion from the Lake intake to a groundwater source directly mitigates vulnerable critical infrastructure (public water supply for CKRWP area), provides a design to eliminate natural hazards (sedimentation and flooding), provides higher

standards for sustainable design (groundwater source with a well field protection plan) and includes the coordination of various entities (partnerships for this project).

There are two (2) LCNRD plans the Source Solution and System Upgrades project will address; the LCNRD Groundwater Management Plan and the 2019 LCNRD Master Plan. The LCNRD also has a Water Quality Management Plan (WQMP) accepted by the EPA October 2019 which serves as a comprehensive strategy to address water and land use deficiencies but is not specifically addressed with this project. The WQMP is available here (https://lcnrd.nebraska.gov/sites/lcnrd.nebraska.gov/files/doc/LCNRD%20WQMP%20FINAL.pdf)

LCNRD Groundwater Management Plan

The LCNRD Groundwater Management Plan (GWMP) was initially drafted in 1986 with amendments in 1995 and 2014. The GWMP identifies goals and objectives to guide management actions in the protection of district groundwater resources. LCNRD has adopted groundwater quantity and quality rules and regulations to further protect groundwater resources. LCNRD actively collects, evaluates, and reports groundwater data for the monitoring and management of groundwater resources. In addition, LCNRD and has worked with the University of Nebraska Lincoln, Conservation and Survey Division (UNL-CSD) and Eastern Nebraska Water Resources Assessment (ENWRA) to better define and increase the understanding of the hydrogeologic framework underlying the district to support the goals and objectives of groundwater management activities. This project supports the goals and objectives of the GWMP stated below.

Goal: Conjunctive use and supply augmentation.

Objective: Utilize water from other sources (other than Missouri River) for development of rural water systems.

Goal: Continued and intensified monitoring efforts to determine the “scope and trend” of contaminant levels in critical areas of the District.

Objective: Voluntary Preventive Programs are offered District wide or targeted to concentrate their effectiveness including - Rural Water Distribution Projects (and other items).

The Source Solution and System Upgrades project provides benefits to the objectives of the GWMP goal to augment conjunctive use and water supply. Converting from the Missouri River source to the identified groundwater source is in direct support of the objective to utilize sources other than the Missouri River for development of rural water systems. In addition, this project supports continued and intensified monitoring efforts by supporting the rural water distribution projects. Development of a Wellhead Protection Plan to identify mechanisms to protect the well fields will be a critical step in identifying protective measures and programs

LCNRD Master Plan

The LCNRD Master Plan is developed every ten (10) years as required by Neb. Rev. Stat. §2-3276. The Mast Plan includes goals for the purposes of natural resource protection and objectives describing methods directed at achieving those goals.

> **Goal -** Take necessary steps to protect and control present water supply with efficient management and to strive for alternative sources when quality supplies are not available.
>
> **Objective 1 -** Continue to provide alternative water supply through rural water projects and work to establish expanded or separate systems where economic potential and dedicated local interest warrants such action.
>
> > The Project directly protects the water supply and strives for alternative supplies through rural water projects and works to establish expanded or separate systems where economic potential and dedicated local interest warrants such action through conversion from surface water to a groundwater source for the 3,000 residents served by CKRWP.

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.

Land rights are required for the sites where well fields will be developed, where the treatment plant will be constructed, and where new transmission lines will be installed. Table 6 (page 23). lists where land rights are needed for the well fields and treatment plant for land purchase. Willing sellers have been identified for the well field and treatment plant locations. Attachment I. includes the locations where easements are needed for new line construction.

A listing of all the easements currently held in locations where upgrades will be made as part of the project for distribution system upgrade or line installation is included as Attachment J. All existing easements are owned by LCNRD and available for review upon request.

10.B Attach proof of ownership for each easements, rights-of-way and fee title currently held.

Attachment J. reflects the easements that are currently held by LCNRD. The LCNRD general manager certifies that the easements are owned by LCNRD for locations where work is planned on existing lines and listed in Attachment J. The easements will be

provided upon request. Those that are currently held will require review and potential modification.

The easements not currently held are listed briefly in Table 7 (page 25). and detailed in Attachment I. These easements will be obtained as part of the project. LCNRD has authority to install infrastructure and to hold title to property to carry out projects as per Neb. Rev. Stat. §§ 2-3233 through 2-3238. LCNRD also has the ability to exercise the power of eminent domain per Neb. Rev. Stat. §§ 2-3233 and 2-3234. There is potential that obtaining easements for one or two of the sites may pose some challenges.

10.C Provide assurance that you can hold or can acquire title to all lands not currently held.

LCNRD has a legal authority to install infrastructure for the conveyance of water to customers per Neb. Rev. Stat. §§ 2-3233 and 2-3234. LCNRD and CKRWP are familiar with requirements for occupying ROW and are prepared to work with Nebraska Department of Transportation (NDOT), Knox County, private property owners, and others to swiftly obtain legal permission to install water lines and related infrastructure (see Neb. Rev. Stat. §2-3230. LCNRD has the ability to exercise the power of eminent domain per Neb. Rev. Stat. § 2-3234 if necessary.

It is not in any way the preference of LCNRD to condemn property to gain access to install water lines. Therefore, if there are insurmountable issues in obtaining an easement on private property LCNRD would pursue the least problematic route with or without condemnation to install/update distribution system components. Condemnation would be the absolute last alternative pursued and would not be undertaken without considerable deliberation.

11. Identify how you possess all necessary authority to undertake or participate in the project.

LCNRD has an obligation to provide safe, reliable drinking water under the Nebraska Safe Drinking Water Act (NSWDA) to the communities, SIDs and rural connections of CKRWP. LCNRD possesses the authority to undertake projects and adjust user rates for such purposes as identified in Neb. Rev. Stat. §2-3238, §2-3239 and §§2-3252 to 2-3257. The aforementioned statute also provides LCNRD the legal authority to borrow money, to issue bonds, and to recover those costs through water use rates.

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

CKRWP’s existing water intake is located in Lewis and Clark Lake. Flooding of the Missouri River and/or upstream tributaries can cause impacts that would result in temporary shutdown of service due to poor source water quality and limits in treatment that can make it difficult to maintain finished water within parameters required by SDWA and implemented through Nebraska Title 179 regulation for public water

systems including drinking water standards https://dhhs.ne.gov/Pages/Title-179.aspx. Flood waters can also impact the electrical components of the intake building resulting in service interruption. The resulting loss of water service presents a significant public health and safety risk to the regional community served by CKRWP.

Sediment poses two risks for the system, 1) increased organic matter in the raw water resulting in levels of TTHMs that exceed the SWDA established MCL and 2) reduced and unreliable raw water capacity from the existing intake to meet production needs. The development of TTHMs, a primary drinking water contaminant, poses public health risks including liver, kidney, or central nervous system problems, and an increased risk of cancers. Loss of water service from sedimentation would present significant public health and safety risk to the regional community served by CKRWP.

If the water source is not secured CKRWP would be forced to determine how best to reduce service to existing customers. Those individuals would be forced to identify an alternative drinking water source putting undue financial burden on those residents.

The existing discharge of backwash resulting from the water treatment process introduces lime solids and trace minerals into Birdsell Creek. Although naturally occurring, these additional inputs can adversely affect the chemical and biological integrity of the stream.

If CKRWPs existing water supply and associated infrastructure are not converted to a source other than the Lake, the current surface water supply and intake facilities will be at risk from advancing sediment and future flooding events. If the project is not completed and conversion to an alternative source is not pursued the ability of CKRWP to continue providing drinking water to the estimated 3,000 customers would be threatened. Furthermore, the costs of updating the existing system and moving the intake further east would not be paid off by the time sediment would reach the new intake structure. Thus, rendering the moved structure unable to meet demands putting CKRWP at risk again to the same concerns faced today.

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.

Describe the specific threats to drinking water the project will address

The Source Solution and System Upgrades project eliminates the dependence of Cedar Knox Rural Water Project (CKRWP) on a surface water intake in Lewis and Clark Lake

(Lake), impounded by Gavins Point Dam on the Missouri River near Yankton, SD. The threat will be remediated by permanently connecting to a groundwater source in Dolphin Township of Knox County that will be developed as part of this project and includes a new water treatment plant, and new and upgraded distribution system components.

Many of the long-term and short-term concerns facing CKRWP have a direct connection to sediment entering the Lake. Encroaching sediment originates from the bed of the Missouri River and from stream and river systems, especially the Niobrara River, that discharge into the Lake and carry high levels of organic matter. Sediment advancement enters the Lake at an estimated rate of 400 feet per year as observed above the surface level of the Lake. The nature of sedimentation in the Lake is compounded by periodic flooding, imminently threatening the security of the intake structure and associated infrastructure. Flooding in 2011 and 2019 significantly advanced sediment in the Lake shortening the potential life expectancy of the intake as a source for CKRWP. The sedimentation and flooding impacts must be remediated to meet the short and long-term needs of CKRWP customers.

The specific threats faced by CKRWP that will be addressed by the project are listed below:

- Sedimentation – Advancing sediment in the Lake is expected to inundate the intake in approximately 20 years (Figure 2. page 12). Sediment will eventually reach and cover the intake structure, significantly reducing the amount of raw water that can be drawn for treatment at the water treatment plant and ultimately distributed to customers. The effect of sedimentation is compounded by flooding events.

  Advancement of the sediment leading edge (below the water surface out ahead of the visible sediment at the surface to the west) has already resulted in higher levels of organic matter entering the intake and will inhibit the intake from operating at full design capacity.

- Disinfection Byproduct Administrative Order (AO) - Encroaching sediment causes organic matter to remain suspended in the flowing which is subsequently drawn into the intake for treatment. As the sediment encroaches there is less time for sediment to settle out of the flowing water before reaching the intake. The increased organic matter in the raw water requires higher levels of chlorination for effective treatment. The impact of higher levels of chlorination is the increased production of a Safe Drinking Water Act (SDWA) regulated disinfection byproduct, Total-Trihalomethanes (TTHMs).

  CKRWP is currently under an AO, issued by the Nebraska Department of Environment and Energy (NDEE) to address TTHM production that exceeds the NSDWA identified maximum contaminant level (MCL) 0.080 mg/L for the four-quarter running average for drinking water.

- Production Capacity - Production capacity of the treatment plant and capacity in portions of the distribution system are at, or near, their maximum sustainable levels. In addition, areas of the distribution system infrastructure require updates or additions including line replacement, upsizing and improvements, water tower replacement, and other needs.

Identify whose drinking water, how many people are affected, how will project remediate or mitigate

CKRWP provides drinking water to approximately 3,000 residents in northern Cedar and Knox Counties of Northeast Nebraska. CKRWP is a rural water system that serves 4 communities Crofton, Fordyce, St. Helena, and Obert; more than 900 rural connections; several campgrounds; and several Sanitary Improvement Districts (SIDs) and housing developments including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten, Lewis and Clark Estates, Hideaway Acres, Autumn Oaks, Prairie Ridge, Bon Homme, Cedar Hills and the Becker Addition (Figure 1. page 11).

Permanently connecting to a groundwater source, constructing a new water treatment plant, and installing new and updating water distribution system infrastructure will remediate the issues facing CKRWP by eliminating the current surface water source.

Provide a history of issues and tried solutions

CKRWP has proactively evaluated an exhaustive list of engineered alternatives to providing safe and reliable water supply and treatment to the system and customers, including 1) relocation of the intake in the Lake and water treatment plant expansion, 2) development of a new intake and water treatment plant on the Missouri River downstream of Gavins Point Dam, 3) purchase of finished water from Yankton, SD, 4) development of a groundwater source in the Missouri River Alluvium with a water treatment plant downstream of Gavins Point Dam near Aten, NE, and 5) development of a groundwater source in Dolphin Township of Knox County with a water treatment plant. The evaluations resulted in the CKRWP Advisory Committee unanimously deciding to pursue development of a groundwater source in Dolphin Township of Knox County and to treat the water as needed with a new water treatment plant. New transmission lines will be required to bring the wells to the new plant and to connect the new plant into the existing system. Additional upgrades to the distribution system are necessary to address aging infrastructure and capacity in areas of the system with significant growth and development.

In 2018 LCNRD reached out to the Omaha District of the U.S. Army Corps of Engineers (USACE) who is responsible for the operation of the mainstream reservoirs on the Missouri River including Lewis and Clark Lake and Gavins Point Dam. The correspondence received (Attachment G.), states that the “Gavins Point Dam project is monitored through reservoir surveys, river profile surveys, and reconnaissance. Based on the original operations criteria, the project is operating as designed, and therefore no

actions to address sedimentation have been performed as part of the normal Operations and Maintenance program for the project. For the foreseeable future, we do not expect a change in the operations and maintenance of Gavins Point Dam and Lewis and Clark Lake." The USACE stance on sedimentation in the Lake compounded by capacity needs supports the decision to consider alternatives to replace surface water as the source.

In 2005, the SDWA lowered the maximum contaminant level (MCL) threshold for TTHMs from 0.100 to 0.080 mg/L which made treatment more limiting to meet that threshold. Modifications were implemented in the treatment process, addressing when, where and how much chlorine was applied at the plant. A chlorine injection point has been added mid-way through the system, and a mixer has been added in the storage tank that is furthest from the plant. Testing for TTHMs is completed at the furthest point of service in the system. These best management practices help to maintain TTHMs levels below the MCL during periods of normal operation however as the sediment encroaches and during times of flood or high flows entering the Lake higher levels of organic matter will be carried in the water requiring increased chlorine disinfection. The increased use of disinfectant increases the creation of disinfection byproducts, TTHMs in this case, and increases the probability of exceeding the SDWA established MCL.

Provide detail regarding long-range impacts if issues are not resolved

Long-range impacts facing CKRWP if this project is not realized include:

- Loss of the ability to draw sufficient water for treatment due to encroaching sediment in the Lake,
- Continued production of TTHMs in excess of the SDWA identified MCL and inability to meet AO requirements. Not meeting the AO requirements would result in fines and other penalties issued by NDEE.
- Capacity of the existing plant and distribution system could not meet the demand of current and future customers regardless of whether the Lake intake could be secured.
- CKRWP would ultimately be required to begin reducing service to approximately 3,000 residents in Northeast Nebraska.

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.

Identify the specific plan that is being referenced including date, who issued it and whether it is an IMP or GW management plan.

The project meets the goals and objectives of an approved integrated management plan (IMP) and groundwater management plan (GWMP). The Lewis and Clark Natural Resources District (LCNRD) voluntary IMP is jointly developed by the Nebraska Department of Natural Resources (NeDNR) and was adopted on September 5, 2016. Since adoption of the IMP, LCNRD has submitted biennial reports to NeDNR reporting progress toward the goals and objectives identified in the plan. The LCNRD GWMP was developed in 1986 and amended in 1995 and 2014 to address changing conditions in the district.

Voluntary Integrated Management Plan (IMP)
The purpose of the voluntary IMP is identified to attain and/or maintain a desired balance between water uses and water supplies of both surface water and groundwater sources. In this way, economic viability, social health, environmental health, public safety, and public welfare in the District can be better achieved and maintained. The voluntary IMP focuses on water supplies of the entire District and incorporates many aspects that mutually benefit other actions of the LCNRD.

Biennially the Lewis and Clark Natural Resources District (LCNRD) and the Nebraska Department of Natural Resources (NeDNR) review and update data collected and tasks completed as part of the jointly developed IMP. The IMP provides a coordinated monitoring and management outline for groundwater as managed by LCNRD and surface water as managed by NeDNR. The two resources are hydrologically connected in some discrete areas of the district and the IMP provides mechanisms to effectively monitor and manage both resources.

The goals identified in the IMP are supported by objectives and tasks to be carried out by NeDNR and/or LCNRD. These actions help LCNRD and NeDNR make progress towards achieving the goals and objectives of the IMP. LCNRD and NeDNR report on progress on identified activities including water levels reporting, irrigation well and irrigated acre expansion permitting, groundwater use reporting, irrigated acre certification, test holes drilling and observation wells development, identification of data gaps, and public outreach.

The IMP goal and objectives this project supports are listed below:

> **IMP Goal 2:** Protect existing water uses while allowing for future water development.
>
> > **Objective 2.1:** Collaborate with local, state, and federal entities to better manage hydrologically connected ground and surface water.
> >
> > **Objective 2.3** Improve water resource sustainability through innovative management strategies.

The Source Solution and System Upgrades project provides benefits to the objectives of the IMP goal and objectives by protecting the existing uses established by LCNRD through the CKRWP by securing an alternative groundwater source that will allow continued use of water while converting from the current surface water source. The design and construction phase of the engineering plan includes intensive testing to evaluate and protect existing domestic, stock, and irrigation uses when developing and designing the well fields and their pumping rates. Having a highly optimized rural water system pumping from a small number of wells to meet the needs of several thousand residents and to meet the demand of agricultural and recreational uses is an innovative strategy that minimizes the impact to smaller surrounding aquifer systems when compared to other potential land use developments. This is especially important in the CKRWP area where aquifers are diverse and limited in extent and quality. Development of a Wellhead Protection Plan will identify further mechanisms to protect the sustainability of the resource.

LCNRD Groundwater Management Plan

The LCNRD Groundwater Management Plan (GWMP) was initially drafted in 1986 with amendments in 1995 and 2014. The GWMP identifies goals and objectives to guide management actions in the protection of district groundwater resources. LCNRD has adopted groundwater quantity and quality rules and regulations to further protect groundwater resources. LCNRD actively collects, evaluates, and reports groundwater data for the monitoring and management of groundwater resources. In addition, LCNRD and has worked with the University of Nebraska Lincoln, Conservation and Survey Division (UNL-CSD) and Eastern Nebraska Water Resources Assessment (ENWRA) to better define and increase the understanding of the hydrogeologic framework underlying the district to support the goals and objectives of groundwater management activities.

This project supports the goals and objectives of the GWMP stated below:

Goal: Conjunctive use and supply augmentation.

Objective: Utilize water from other sources (other than Missouri River) for development of rural water systems.

Goal: Continued and intensified monitoring efforts to determine the “scope and trend” of contaminant levels in critical areas of the District.

Objective: Voluntary Preventive Programs are offered District wide or targeted to concentrate their effectiveness including - Rural Water Distribution Projects (and other items).

This project provides benefits to the objectives of the GWMP goal to augment conjunctive use and water supply. Converting from the Missouri River source to the identified groundwater source is in direct support of the objective to utilize sources other than the Missouri River for development of rural water systems. In addition, this project

supports continued and intensified monitoring efforts by supporting the rural water distribution projects. Development of a Wellhead Protection Plan to identify mechanisms to protect the well fields will be a critical step in identifying protective measures and programs.

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

   List the following information that is applicable:

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

The location, area and amount of recharge

CKRWP annually draws 150 million gallons from the Lake to meet drinking water needs. That water will no longer be removed from the Lake therefore it will remain as flow in the Missouri River Basin. At least a portion of that water would contribute to the aquifer storage in the alluvial Lake and River aquifers. The water will be available to other entities for use locally and downstream. It is important to recognize that water releases from Gavins Point Dam are managed by the Army Corps of Engineers (USACE) and that ultimately water flows and aquifer levels are dictated by the water level in the Lake and by releases to the River.

The location, area and amount that aquifer depletion will be reduced

With the conversion to a groundwater source development of a Wellhead Protection Plan (WHPP) will be critical to identifying mechanisms to protect the resource. Of primary importance is reducing aquifer depletion. The WHPP has not yet been drafted and will be undertaken with guidance of the CKRWP Advisory Committee and LCNRD Board of Directors following design and development of the well fields.

Education is a priority in the LCNRD IMP. Educating landowners and farmers in the vicinity of the CKRWP well fields will be a priority for irrigation management decisions. Water conservation education efforts are and will continue to be recommended for CKRWP customers, reducing depletion impacts on the aquifer.

The reach, amount and timing of increased stream flow. Describe how the project will meet these objectives and what the source of the water is;

CKRWP annually draws 150 million gallons from the Lake to meet drinking water needs. That water will no longer be removed from the Lake and will remain as flow in the Missouri River Basin. The water will be available to other entities for use locally and downstream. The function of the Lake and Birdsell Creek will be restored when CKRWP is no longer drawing water from the Lake or introducing backwash to the Creek. The primary watershed impacted by ceasing to draw water from the Lake and by ceasing to

discharge backwash is the Charley Creek-Lewis and Clark Lake Watershed (HUC 101701010908) although the entire Lewis and Clark Lake Watershed (HUC 10170101) and all downstream watersheds benefit from the change.

Provide a detailed listing of cross basin benefits, if any

Cross basin benefits include ending withdrawals from the Lake which ultimately helps maintain flows for downstream habitat, wildlife, drinking, and other uses including other drinking water users obtaining water from alluvial aquifers associated with the Missouri River. LCNRD is also focusing on utilizing groundwater sources from within the district as the source to replace the intake in the Lake. Many rural residents utilize local groundwater sources for all of their water needs or for needs other than drinking water needs served by CKRWP. In these cases, the customer is reducing their monthly cost for water, reducing demand on the CKRWP water source, and spreading out use to multiple aquifers across the CKRWP service area. Utilization of local aquifers for non-drinking water purposes throughout the service area reduces demand on CKRWP service and production from the proposed supply wells. For example, the Crofton Golf Course relies on a removable surface water intake to irrigate the golf course which reduces the demand on the identified groundwater source for the long-term. Other entities within the service area utilize groundwater wells for purposes other than drinking water needs, such as watering lawns, watering gardens, recreational use, irrigating crops, and watering livestock for example.

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.

List the goals the project provides benefits; and
Describe how the project will provide these benefits

The goal of the CKRWP project is to provide a sustainable supply of potable water to the communities and rural connections served by the system. In meeting this goal CKRWP will also provide the following benefits:

1) Flood control by safeguarding water supply for rural, municipal, agricultural, and commercial/industrial uses.
2) Agricultural use by maintaining a reliable rural water source and distribution system that serves both domestic and stock/pasture water needs.
3) Municipal and industrial use by maintaining a water source and distribution system to serve the communities of Crofton, Fordyce, St. Helena and Obert.

4) Recreational benefits are enhanced by providing drinking water to campgrounds, businesses, sanitary improvement districts (SIDs), and other connections along the Lake and River where recreation attracts residents and visitors to the area and supports the economy of the local residents and communities.
5) Conservation and preservation of water resources are realized through providing a reliable source of drinking water to the area, reducing individual demand on the limited aquifer system that exists across much of the CKRWP service area. The presence of groundwater sources is highly variable due to the action of glaciers and in many cases the resource is absent. Figure 4. (page 19) represents the area of aquifer absent and depth to bedrock in LCNRD which correlates to the service area of CKRWP (see Figure 1. page 11). The project also helps ensure the availability of high quality drinking water throughout the service area where water quality is highly variable.

Provide a long range forecast of the expected benefits this project could have versus continuing on current path

In the event the CKRWP project is not implemented; and the Lake continues to be the source for CKRWP, the eventual outcome would be the loss of water service to system customers due to the reduced capacity to draw water. CKRWP would also face fines from NDEE for failure to meet requirements of the AO that requires securing a long-term, viable solution to reduce TTHM production. In addition, CKRWP would be required to identify an alternative solution to satisfy the AO issued due to production of the disinfection byproduct TTHM in excess of the SWDA MCL. Resolving the AO through methods other than a source water change would not solve the ultimate problem facing CKRWP with encroaching sediment that carries the organic matter into the system and which will restrict the water supply.

If CKRWP does not continue with a groundwater source as proposed, LCNRD could choose to connect to the City of Yankton which has an estimated present value cost impact of $83,895,185 over the next 50 years versus the estimated present value cost of $73,273,514 to pursue groundwater (inference between details in Attachments L. and K.). This will present a financial burden for the communities, rural residents, SIDs and campgrounds served by CKRWP and would negatively impact the economic viability and vitality in northeast Nebraska. Nebraska residents would be providing payment to South Dakota supporting out of state entities as opposed to maintaining use of local resources and supporting the local economy.

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.

Describe how the project will maximize the increased beneficial use of Nebraska's water resources

The Nebraska State Legislature identifies in Neb. Rev. Stat. § 46-613 "Preference in the use of groundwater shall be given to those using the water for domestic purposes. They shall have preference over those claiming it for any other purpose. Those using the water for agricultural purposes shall have the preference over those using the same for manufacturing or industrial purposes."

The proposed project maximizes the use of Nebraska's water resources for the highest beneficial use of domestic supply for the customers of the Cedar Knox Rural Water Project. Converting from an at-risk surface water source to a higher quality, more secure groundwater source fulfills this purpose. Water will be conserved due to an anticipated reduction in wastewater produced and discharged as part of the water treatment process over the current treatment for surface water. The best alternative groundwater treatment process will be determined during the design phase of the new water treatment plant. It is a priority for the CKRWP Advisory Committee and LCNRD Board of Directors to pursue the most resource protective and fiscally responsible solution for treating nitrate, hardness, and/or manganese. One option that has been requested for design consideration is to use biological water treatment if nitrate removal is required.

Describe the beneficial uses that will be reduced if any

There are no anticipated reductions in current beneficial uses. However, construction of the public water supply wells would limit future development of irrigation for agricultural use within 1,000 feet of the production wells proposed for the project.

Describe how the project provides a beneficial impact to the state's residents

The project provides a beneficial impact to the state's residents by eliminating the risk of sedimentation and flooding to the CKRWP intake and significantly reducing or eliminating production of the disinfection byproduct TTHM. The proposed project provides a permanent solution to these concerns through development of a groundwater source located outside of the current Lake source. This also eliminates the potential need for CKRWP to rely on state or federal funding sources to address emergencies from flooding and sedimentation in the future.

The discharge of backwash from the water treatment process introduces high concentrations of lime into Birdsell Creek. This additional input to the environment can adversely affect the chemical and biological integrity of the stream. Eliminating the discharge would directly benefit surface water quality and wildlife. NDEE has permitted discharge of backwash into Birdsell Creek with the understanding that a long-term solution to address the AO could include retirement of the existing surface water plant. If LCNRD is to make upgrades to, and continue utilizing the water treatment plant in the

Devils Nest an acceptable treatment for backwash discharge would need to be identified with NDEE.

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.

List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.

The preferred CKRWP project is estimated to cost $32,000,000 as detailed in the following summary:

Activity	Cost Estimate
Engineering Design and Construction AdminServices for Distribution System Improvements	$535,000
Engineering Design and Construction Admin Services for WTP, Wells, and Transmission Facilities	$2,150,000
Permitting	$25,000
Other Professional Services (legal, fiscal, administrative, etc.)	$750,000
Land Easement Acquisitions	$1,900,000
Well Field Development	$2,330,000
Water Treatment Plant Construction & Observation	$17,940,000
Distribution System Construction	$6,370,000
Total	**$32,000,000**

The annual Operating and Maintenance (O&M) costs are estimated to be $850,000 annually for the life of the project. Over a 50-year period the present value cost of this project to CKRWP's customers would be $73,273,514. The cost associated with this option is summarized in the simplified Life Cycle Analysis Figure 7. below and detailed Life Cycle Analysis Attachment K.

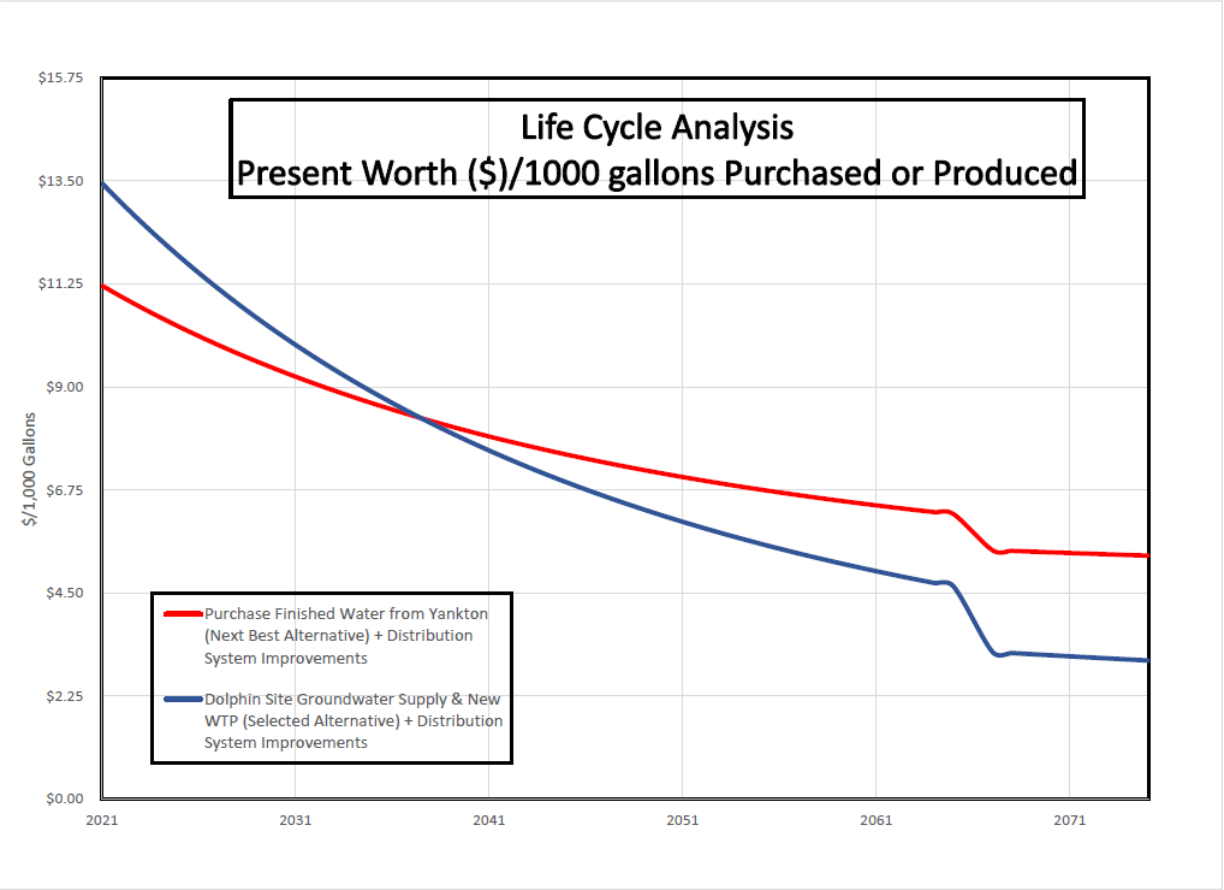

Figure 7. Life Cycle Analysis - Present Worth ($)/1000 gallons Purchased or Produced

Land and water acquisition costs

The cost for land acquisition is included in the request for funding. Purchase agreements have been entered into for the two proposed well sites. A location and price have been established with a willing landowner for the treatment plant site. Easements will be obtained following the design phase of the distribution system and water treatment plant. The estimated cost of land acquisition is estimated at $1.9 million.

Alternative Options

The best alternative to the CKRWP Source Solution and System Upgrades project is the implementation of a water purchase agreement with the City of Yankton, SD. The CKRWP Source Solution and System Upgrades project has an estimated capital cost of $32,000,000 (2021$) with an O&M cost of $850,000 per year (2021$). The capital cost of connection to the City of Yankton, SD for water service is $17,500,000 (2021$) with an annual O&M cost ($545,000) plus cost to purchase water ($559,821) totaling $1,104,821 (2021$). Looking at these costs over the 50-year life of the projects the present cost value of pursuing groundwater is $73,273,514 while purchasing water from the City of Yankton is $83,895,185 (inference between details in Attachments L. and

K.). This gives a present value savings of $10,621,672 by pursuing the groundwater option.

Value of benefits gained

The ability of CKRWP to provide a sustainable supply of potable water is essential to Northeast Nebraska and the rural residents and communities served. If CKRWP were unable to secure a water source the communities and rural customers would be left to identify alternative sources. This would leave approximately 3,000 residents without a water source impacting the entire service area as shown in Figure 1 (page 11). Providing a supply of potable water is essential to the success of all communities and is essential for maintaining public health. In the CKRWP service area the challenge for rural residences to construct domestic wells has resulted in more than 900 rural connections including several sanitary improvement districts, housing developments and campgrounds, that depend on CKRWP to provide a safe, reliable source. Lewis and Clark Lake provides economic benefits to Northeast Nebraska through recreation opportunities for local residents and visitors. The ability of CKRWP to provide drinking water to meet those needs is essential to the economic viability of the region not only to support recreation but for the daily needs of residents.

The CKRWP Source Solution and System Upgrades project is required to maintain the existing level of service currently provided to the customers of the system. Maintaining the current surface water treatment process would result in the eventual loss of the ability to serve the existing customers and would not address the AO for disinfection byproduct production which would put the health of customers at risk. The sediment encroachment is beyond the control of LCNRD and CKRWP however the consequences and costs resulting from the sediment must be proactively addressed to maintain water service to CKRWP connections.

Compare costs to other methods of achieving the same benefit

The CKRWP Source Solution and System Upgrades project has an estimated capital cost of $32,000,000 (2021$) with an O&M cost of $850,000 per year (2021$). The capital cost of connection to the City of Yankton, SD for water service is $17,500,000 (2021$) with an annual O&M cost ($545,000) plus cost to purchase water ($559,821) totaling $1,104,821 (2021$). Looking at these costs over the 50-year life of the projects the present cost value of pursuing groundwater is $73,273,514 while purchasing water from the City of Yankton is $83,895,185 (inference between details in Attachments L. and K.). This gives a present value savings of $10,621,672 by pursuing the groundwater option.

List the costs of the project

The cost of the CKRWP Groundwater Conversion Project is estimated to be $32,000,000 (2021$) and an annual O&M cost of $850,000 (2021$).

Describe how it is a cost effective project or alternative

Currently, technology does not exist that would be a cost-effective means to address sedimentation in the Lake. The Army Corps of Engineers (USACE) is responsible for operation and maintenance of the mainstem Missouri River structures including Gavins Point Dam and Lewis and Clark Lake. USACE provided a letter to LCNRD in 2018 (Attachment G.) that states, in part, "Our staff here understand that sedimentation is a chronic concern and have been working on a number of studies to evaluate reservoir sustainability and long-term operations. At this time, none of the studied actions have proven cost effective to implement." Therefore, LCNRD must identify an alternative to the Lake to meet source water needs for CKRWP to continue service to the customers who depend on the system. This CKRWP Source Solution and System Upgrades project addresses the long-term issue of securing a source that will eliminate the sedimentation impact to the system and addresses the short-term concern of the disinfection byproduct AO. Groundwater will provide a reliable, high-quality source that when treated provides security for the long-term needs of CKRWP and is protected from the impacts of flooding and sedimentation.

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.

Identify the interstate compact, decree, state contract or agreement or federal law

The CKRWP Source Solution and System Upgrades project addresses the federal law associated with the Safe Drinking Water Act (SDWA), a federal mandate passed by Congress in 1974. Under the federal SDWA, CKRWP has a legal and fiduciary responsibility to maintain a dependable and adequate supply of safe water for their customers. The federal SDWA recognizes people are entitled to expect safe drinking water. It provides for the protection of human health and prevents drinking water health hazards through the control and regulation of drinking water systems and drinking water testing. Therefore, taking action to secure a long-term, sustainable, drinking water source for the communities and rural customers served by the system is considered a federal mandate.

Federal SDWA capacity development provisions establish a flexible framework for the water systems and partners including NDEE to work together to acquire and maintain technical, financial, and managerial resources, achieving the health objectives of the SDWA. Under the SDWA, minimum standards are required to be maintained by public water suppliers, per the U.S. Environmental Protection Agency (EPA). Disinfection of

surface water for pathogens and organic material is a normal part of the treatment process. Chlorine is used to disinfect or inactivate (kill) the organic matter. However, when chlorine reacts with the naturally occurring materials in the water it forms disinfection byproducts such as Total-Trihalomethanes (TTHM or TTHMs).

The EPA rule regulating TTHM in drinking water that impacts CKRWP is the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) 71 FR 388, January 4, 2006, Vol. 71, No. 2. A "Quick Reference Guide" for the Stage 1 and Stage 2 rules is available at the EPA website link, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100C8XW.txt.

Describe how the project will help the state meet its obligations under compacts, decrees, state contracts or agreements or federal law.

The Source Solution and System Upgrades project will allow CKRWP to comply with the SDWA requirements by providing a reliable, high quality water supply that is sustainable and significantly reduces the risk of exceeding the MCL for the SDWA regulated disinfection byproduct TTHM. TTHM is a byproduct of chlorine disinfection. Chlorine disinfection will be significantly reduced with the conversion to groundwater which contains very little organic matter therefore TTHM production will also be significantly reduced which will provide a NDEE approved mechanism to resolve the AO.

Describe current deficiencies and document how the project will reduce deficiencies.

As the sediment plume advances to the CKRWP intake more organic matter is carried, suspended in the source water, and is drawn into the intake which requires increased chlorination to effectively treat the organic matter present. In the case of CKRWP, chlorination results in production of TTHM at levels that exceed the MCL of 0.080 mg/L for the SDWA regulated disinfection byproduct for the quarterly annual running average. CKRWP is under Administrative Order (AO) from the Nebraska Department of Environment and Energy (NDEE) to address TTHM production.

The CKRWP Source Water Conversion Project will change the water source from surface water to groundwater which will significantly reduce or eliminate the need for disinfection. The reduced need for disinfection is due to there being much lower levels of pathogens or organic matter present in groundwater sources. The lower levels of pathogens and organic matter results in much lower levels of required disinfection. Less disinfection also results in significantly reduced potential for TTHM production. Therefore, the potential for deficiency in development of TTHM will also be significantly reduced.

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.

Identify the property that the project is intended to reduce threats to

CKRWP provides water to a service area in northern Cedar and Knox Counties (Figure 1. page 11). The sediment and related impacts threaten the viability of CKRWP and threaten service to 4 communities provided water, Crofton, Fordyce, St. Helena and Obert. There are several sanitary improvement districts (SIDs) and housing developments served, including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten and the Becker Addition. There are also more than 900 rural connections; the majority serve domestic/household needs, some serve pasture or livestock operations, and others serve campgrounds and businesses along the Lake and Missouri River.

CKRWP has the potential to expand the service area or to connect additional communities with the development of a secure source with secured capacity. There are several reasons communities may look for alternatives outside of their existing sources including O&M costs, nitrate contamination, and other costs associated with meeting SWDA requirements.

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

The risk of loss to safe and reliable water to a community in any given year is immeasurable. Without an improvement project, the existing intake in Lewis and Clark Lake and water treatment plant are susceptible to the inundation by sediment and the related impacts. These concerns and the need for fast action are compounded by frequent flooding events advancing sediment at up to 10 times the rate of annual sediment advancement without flood impacts (per Missouri Sedimentation Action Coalition). Continuing with the intake in Lewis and Clark Lake will result in the eventual loss of water service and will present a significant public health and safety risk to the community. The planned public well field under the Source Solution and System Upgrades project has the following designs to alleviate the threat to the community water supply:

- Centrally located on the south side of the existing CKRWP water system.
- Sufficient quantities of raw water available.
- Lower levels of nitrates, manganese, and hardness make treatment options less complicated and less expensive.

- Sufficient land available for adequately sized WTP Site and additional well development if needed in the future.
- Groundwater dramatically reduces the likelihood of Disinfection Byproducts forming in the water system.
- Potential for additional water sales by constructing the WTP and transmission piping in this area.

Identify the potential value of cost savings resulting from completion of the project

The CKRWP Groundwater Conversion Project has an estimated capital cost of $32,000,000 (2021$) with an O&M cost of $850,000 per year (2021$). The capital cost of connection to the City of Yankton, SD for water service is $17,500,000 (2021$) with an annual O&M cost ($545,000) plus cost to purchase water ($559,821) totaling $1,104,821 (2021$). Looking at these costs over the 50 year life of the projects the present cost value of pursuing groundwater is $73,273,514 while purchasing water from the City of Yankton is $83,895,185 (inference between details in Attachments L. and K.). This gives a present value savings of $10,621,672 by pursuing the groundwater option.

Describe the benefits for public security, public health and safety

The CKRWP Source Solution and System Upgrades project will provide potable water which is essential for maintaining the community's public security, public health and safety. The project will reduce threats to the entire service area by converting from the at-risk surface water intake in the Lake to a groundwater source. The surface water intake and source will not meet the long-term needs of the system due to sedimentation that is encroaching in the Lake and threatening the intake. Sediment advancement is intensified by flood events. The service area residents (public) will benefit from a protected drinking water source designed for long-term service that meets the Safe Drinking Water Standards and is not under imminent threat of sedimentation or flooding.

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.

Water quality issue(s) to be improved

The sediment encroachment on the CKRWP intake has increased the organic matter content suspended in the water, which requires additional chlorine to remove the organic matter. The increased chlorination results in elevated production of Safe

Drinking Water Act (SDWA) regulated disinfection byproducts. CKRWP is under an Administrative Order (AO) from the Nebraska Department of Environment and Energy (NDEE) to address one of these byproducts, Total-Trihalomethanes. (TTHMs). The project is meant to bring TTHM concentrations within the standards of the Safe Drinking Water Act so that drinking water supplies provided by the Cedar Knox Rural Water Project are safe for consumers to use and consume. The Safe Drinking Water Act is a federal mandate passed by Congress in 1974.

This project will eliminate direct backwash discharge benefiting surface water quality. The discharge of backwash from the water treatment process introduces high concentrations of lime into Birdsell Creek. This additional input to the environment can adversely affect the chemical and biological integrity of the stream.

Describe how the project improves water quality/populations/usage of water

The project improves water quality by converting from the existing surface water source to a high-quality groundwater source consequently reducing the amount of chlorination and therefore the concentration of TTHMs. This source conversion also eliminates the current discharge of backwash that introduces lime into Birdsell Creek.

The target area is the service area of CKRWP (Figure 1. page 11) and the population receiving benefits includes the estimated 3,000 residents served by CKRWP: 4 communities who are provided water, Crofton, Fordyce, St. Helena and Obert. There are also more than 900 rural connections, many of which are for domestic/household use, some serve pasture or livestock operations, and others serve campgrounds and businesses along the Lake and Missouri River. There are also several sanitary improvement districts (SIDs) and housing developments with connections to CKRWP including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten, Lewis and Clark Estates, Hideaway Acres, Autumn Oaks, Prairie Ridge, Bon Homme, Cedar Hills and the Becker Addition. The usage of the drinking water produced is:

1) Agricultural use for stock and pasture water needs in the rural setting.
2) Residential and industrial use by rural connections and for SIDs across the service area and by homes, businesses, and industries in the communities of Crofton, Fordyce, St. Helena and Crofton.
3) Recreational use by campgrounds, businesses, and other connections along the Lake and River where recreation attracts residents and visitors to the area and supports the economy of the local residents and communities.

Describe other possible solutions

CKRWP has proactively evaluated an exhaustive list of engineered alternatives to providing safe and reliable water supply and treatment to the system and customers. CKRWP contracted with B&W to evaluate options available to increase capacity and to meet demand needs of 1.2 to 1.5 million gallons per day (MGD) to its customers. (see Attachment C.). The report documents the pros and cons of a number of alternatives as indicated below.

1. Relocate the raw water intake in the Lake and expand the existing water treatment plant.
2. Develop a new surface water intake and water treatment plant on the Missouri River downstream of Gavins Point Dam.
3. Purchase finished water from Yankton, SD.
4. Develop a groundwater source in the Missouri River Alluvium with a new water treatment plant downstream of Gavins Point Dam near Aten, NE
5. Develop a groundwater source in Dolphin Township of Knox County with a new water treatment plant.

The evaluations resulted in the CKRWP Advisory Committee unanimously deciding to pursue development of a groundwater source in Dolphin Township of Knox County and to treat the water as needed with a new water treatment plant. New transmission lines will be required to bring the wells to the new plant and to connect the new plant into the existing system. Additional upgrades to the distribution system are necessary to address aging infrastructure or capacity in areas of the system with significant growth and development.

Describe the history of the problem and other attempts to remedy

CKRWP's need to meet current and future demand prompted the initial investigation and consideration of modifications to the water treatment plant and distribution system in 2016 (Attachment D.). Shortly after completion of the initial investigation, the above-referenced AO was issued due to the TTHM disinfection byproducts levels exceeding the MCL. Additional investigation followed in 2017 to evaluate the capability of the intake structure in the Lake and associated equipment/piping to meet increased capacity via the existing water treatment plant. The 2017 PER also investigated other options to address alternatives to address TTHM production and capacity (Attachment E.). Many of the long-term and short-term concerns facing CKRWP have a direct connection to the encroaching sediment in Lewis and Clark Lake.

In 2005, the SDWA lowered the maximum contaminant level (MCL) threshold for TTHMs from 0.100 to 0.080 mg/L which made treatment more limiting to meet that threshold. Modifications were implemented in the treatment process, addressing when, where and how much chlorine was applied at the plant. A chlorine injection point has been added mid-way through the system, and a mixer has been added in the storage tank that is furthest from the plant. Testing for TTHMs is completed at the furthest point of service in the system. These best management practices help to maintain TTHMs levels below the MCL during periods of normal operation however as the sediment encroaches and during times of flood or high flows entering the Lake higher levels of organic matter will be carried in the water requiring increased chlorine disinfection. The increased use of disinfectant increases the creation of disinfection byproducts, TTHMs in this case, and increases the probability of exceeding the SDWA established MCL.

In 2018 LCNRD reached out to the Omaha District of the U.S. Army Corps of Engineers (USACE) who is responsible for the operation of the mainstream reservoirs on the

Missouri River including Lewis and Clark Lake and Gavins Point Dam. The correspondence received (Attachment G.), states that the “Gavins Point Dam project is monitored through reservoir surveys, river profile surveys, and reconnaissance. Based on the original operations criteria, the project is operating as designed, and therefore no actions to address sedimentation have been performed as part of the normal Operations and Maintenance program for the project. For the foreseeable future, we do not expect a change in the operations and maintenance of Gavins Point Dam and Lewis and Clark Lake.” The USACE stance on sedimentation in the Lake compounded by capacity needs supports the decision to consider alternatives to replace surface water as the source.

CKRWP has proactively evaluated an exhaustive list of engineered alternatives to providing safe and reliable water supply and treatment system for the customers. The CKRWP worked with UNL-CSD to conduct an investigation of groundwater resources for consideration as an alternative source for CKRWP. The results of the investigation were provided to CKRWP contracted engineering firms for inclusion in the 2021 Preliminary Engineering Report (PER) which is included as Attachment C.

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.

Identify the local jurisdiction that supports the project

The Cedar Knox Rural Water Project was constructed in 1981 to provide domestic water to residents of parts of Knox and Cedar Counties. The local jurisdiction that sponsors and supports the project is the Lewis and Clark Natural Resources District (LCNRD). LCNRD is responsible for oversight of the Cedar Knox Rural Water Project (CKRWP) operations and is ultimately responsible for financial commitments of CKRWP and projects undertaken. LCNRD possesses the authority to undertake projects and adjust user rates for such purposes as identified in Neb. Rev. Stat. §§ 2-3238 and §§ 2-3252 to 2-3257. The aforementioned statutes also provide LCNRD the legal authority to borrow money, to issue bonds, and to recover those costs through water use rates. There are no tax dollars used in the operation of CKRWP. The system is fully operated through customer fees and water rates.

Neb. Rev. Stat. §§2-3252 through 2-3257 allows for establishment of improvement projects by NRDs and identifies the authority of NRDs to set customer rates, borrow money and/or issue bonds. LCNRD is provided legal authority under Neb. Rev. Stat. §2-3238 to govern the development and delivery of water service in a uniform manner for the benefit of the District and it’s members. LCNRD also has the ability to levy taxes per Neb. Rev. Stat. §2-3225. However, user fees are required to cover the cost of system

operation and no local tax dollars are used for this purpose. An Advisory Committee was appointed by LCNRD for the purpose of making recommendations to LCNRD on all phases of operation.

The Cedar Knox Rural Water Project (CKRWP) is Project Co-Sponsor and fully supports the proposed project (see letter of support, Attachment A.). CKRWP is responsible for the day-to-day operation of the water system and for maintaining a viable system for long-term service to customers through the Advisory Committee that provides recommendations to LCNRD for ratification. CKRWP has conducted preliminary engineering over the last seven years to evaluate options and determine the best path forward to secure the most cost effective and resource effective long-term, resilient water supply to serve the needs of

List current property tax levy, valuations, or other sources of revenue for the sponsoring entity

The current tax levy for LCNRD is 0.027434 and the current valuation of property in LCNRD is $4,037,391,161. The fiscal year 2022 operating budget for LCNRD including CKRWP operations is $3.8 million of that figure $1.7 million is the budget figure for CKRWP. The budget forms filed with the State of Nebraska include budget information for both LCNRD and CKRWP and are available at the State Auditor's website, https://auditors.nebraska.gov/Budgets_Filed/2022/Lewis_and_Clark_NRD_B2122.pdf

LCNRD possesses the authority to undertake projects and adjust user rates for such purposes as identified in Neb. Rev. Stat. §§ 2-3252 to 2-3257. The aforementioned statutes also provides LCNRD the legal authority to borrow money, to issue bonds, and to recover those costs through water use rates. There are no tax dollars used in the operation of CKRWP. The system is fully operated through customer fees and water rates.

CKRWP has budgeted and will continue to budget sufficiently for operation and maintenance of the system.

List other funding sources for the project

An American Recovery Plan Act (ARPA) funding award in the amount $7.0 million has been designated for the Source Solution and System Upgrades project through action of the 2022 Nebraska Legislature in LB1014e Section 53. NDEE is the entity responsible for distributing the funds pertaining to this project. The NDEE Drinking Water State Revolving Fund (DWSRF) program administrators have indicated in the annual Intended Use Plan (IUP) that funding will be provided for the project. Of the total allocated $10.865 million is for loan forgiveness and the remaining amount is available for loan. NDEE is responsible for distributing DWSRF monies and will reimburse project expenses with receipt of eligible expenses. The amount not covered by ARPA and DWSRF is $14.135 million. CKRWP is requesting 60% of the remaining $14.135 million

from WSF which is equal to $8.481 million. CKRWP will utilize DWSRF loan or will issue bonds for all or part of the $5.654 million not covered by other sources.

Summary of Anticipated Funding Sources
$7 million – American Recovery Plan Act allocation
$10.865 million – State Revolving Fund (SRF) loan forgiveness
$8.481 million – Water Sustainability Fund
$5.654 million – Cedar Knox Rural Water Project – loan through SRF or bonding
$32.0 million – Total Project Cost

If CKRWP were to obtain additional funding, the amount of funding requested from the Commission would be adjusted to reflect the additional funding brought into the project.

CKRWP's letter of financial commitment is included as Attachment A. of this application. NDEE administers the DWSRF and the ARPA program, and has endorsed the project through a Letter of Support, which is included as Attachment B.

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.

List the local jurisdiction and identify specific plans being referenced that are in place to support sustainable water use

LCNRD has jurisdiction and implements board approved plans to support sustainable water use including the following: Groundwater Management Plan, Integrated Management Plan (IMP), Groundwater Quality Management Plan, Cedar and Knox County Hazard Mitigation Plan, LCNRD Master Plan, and Long Range Implementation Plan.

The project meets the goals and objectives of an approved integrated management plan (IMP) and groundwater management plan (GWMP). The Lewis and Clark Natural Resources District (LCNRD) voluntary IMP is jointly developed by the Nebraska Department of Natural Resources (NeDNR) and was adopted on September 5, 2016. Since adoption of the IMP, LCNRD has submitted biennial reports to NeDNR reporting progress toward the goals and objectives identified in the plan. The LCNRD GWMP was

developed in 1986 and amended in 1995 and 2014 to address changing conditions in the district.

LCNRD will have jurisdiction over the Wellhead Protection Area for the proposed well field locations. At this time, final engineering has not been completed and the Wellhead Protection Area is not defined by NDEE. LCNRD will initiate development of a Wellhead Protection Plan (WHPP) that will include, at a minimum, recommendations for best management practices with regards to the use of nitrogen based fertilizers and pesticides in the Wellhead Protection Area.

Provide the history of work completed to achieve the goals of these plans

Much groundwork has been done over the years related to the sustainability goals outlined in the GWMP, IMP, and other local plans. Some of the work towards sustainability related goals includes updating rules and regulations or creating new related action plans. The LCNRD also has a Water Quality Management Plan (WQMP) accepted by the EPA October 2019 and is available here https://lcnrd.nebraska.gov/sites/lcnrd.nebraska.gov/files/doc/LCNRD%20WQMP%20FINAL.pdf.

Integrated Management Plan (IMP)
The goals identified in the IMP are supported by objectives and tasks to be carried out by NeDNR and/or LCNRD. These actions help LCNRD and NeDNR make progress towards achieving the goals and objectives of the IMP. LCNRD and NeDNR report on progress on identified activities including water levels reporting, irrigation well and irrigated acre expansion permitting, groundwater use reporting, irrigated acre certification, test holes drilling and observation wells development, identification of data gaps, and public outreach.

LCNRD Groundwater Management Plan
The GWMP identifies goals and objectives to guide management actions in the protection of district groundwater resources. LCNRD has adopted groundwater quantity and quality rules and regulations to further protect groundwater resources (adopted in August 2014 in response to significant irrigation development and drought conditions of 2012). The rules include the requirement of permits for high capacity well development and expansion of irrigated acres. The rules also establish required irrigation management in times of sustained groundwater decline. LCNRD actively collects, evaluates, and reports groundwater data for the monitoring and management of groundwater resources. The LCNRD groundwater monitoring network now includes approximately 60 monitoring wells. In addition, LCNRD and has worked with the University of Nebraska Lincoln, Conservation and Survey Division (UNL-CSD) and Eastern Nebraska Water Resources Assessment (ENWRA) to better define and increase the understanding of the hydrogeologic framework underlying the district to support the goals and objectives of groundwater management activities.

AEM surveys were conducted in 2018 (WSF#5189) with, in part, specific intent to find an alternate source than the Missouri River as stated in the GWMP and to protect existing water uses and continuing to allow future development. The AEM was targeted in areas where groundwater source potential was identified as being high, based on known conditions, background information collected through routine irrigation water sampling, test hole data, monitoring well data, and regional knowledge. Six (6) sites were investigated using AEM surveys. AEM survey is a geologic investigation method that is described on the http://enwra.org/projects.html website as follows. "AEM survey is a very rapid and efficient way of remotely sensing geology across an entire site without engaging in extensive drilling. In AEM surveys, a geophysical device (typically bullet or hoop-shaped) containing sensors is suspended beneath an aircraft (can be helicopter or fixed-wing). An electromagnetic field is continuously transmitted to the land surface (and subsurface) while the aircraft is in flight and the sensors carried under the aircraft receive the subsequent return of electromagnetic energy from the land surface."

Wellhead Protection Plan

LCNRD will develop a Wellhead Protection Plan (WHPP) through Nebraska's Wellhead Protection Program (WHP) for the proposed well field locations with completion of the project. Nebraska's Wellhead Protection Program (WHP) is a voluntary program which assists communities and other public water suppliers in preventing contamination of their water supplies. The Nebraska Legislature passed LB 1161 in 1998 (Neb. Rev. Stat. §46-1501 – 46-1509), creating the Wellhead Protection Area Act. This Act sets up a process for public water supply systems to use if they choose to implement a local Wellhead Protection plan. The goal of Nebraska's Wellhead Protection Program is to protect the land and groundwater surrounding public drinking water supply wells from contamination. Since approximately 85% of Nebraskans receive their drinking water from groundwater, preventing groundwater contamination is vital.

List which goals and objectives this project will provide benefits for and how this project supports or contributes to those plans

Integrated Management Plan

The IMP goal and objectives the Source Solution and System Upgrades project supports are listed below:

IMP Goal 2: Protect existing water uses while allowing for future water development.

Objective 2.1: Collaborate with local, state, and federal entities to better manage hydrologically connected ground and surface water.

Objective 2.3 Improve water resource sustainability through innovative management strategies.

This project provides benefits to the objectives of the IMP goal and objectives by protecting the existing uses established by LCNRD through the Cedar Knox Rural Water Project by securing an alternative groundwater source that will allow continued use of water while converting from the current surface water source. The design and construction phase of the engineering plan includes intensive testing to evaluate and protect existing domestic, stock, and irrigation uses when developing and designing the well fields and their pumping rates. The nature of a rural water system pumping from a small number of wells to meet the needs of several thousand residents and to meet the demand of agricultural and recreational uses is an innovative strategy that minimizes the impact to smaller aquifer systems in an area where aquifers are diverse and limited in extent and quality. Figure 4. (page 19) represents the area of aquifer absent and depth to bedrock in LCNRD which correlates to the service area of CKRWP (see Figure 1. page 11).

LCNRD Groundwater Management Plan

This project supports the goals and objectives of the GWMP stated below:

Goal: Conjunctive use and supply augmentation.

Objective: Utilize water from other sources (other than Missouri River) for development of rural water systems.

Goal: Continued and intensified monitoring efforts to determine the “scope and trend” of contaminant levels in critical areas of the District.

Objective: Voluntary Preventive Programs are offered District wide or targeted to concentrate their effectiveness including - Rural Water Distribution Projects (and other items).

This project provides benefits to the objectives of the GWMP goal to augment conjunctive use and water supply. Converting from the Missouri River source to the identified groundwater source is in direct support of the objective to utilize sources other than the Missouri River for development of rural water systems. In addition this project supports continued and intensified monitoring efforts by supporting the rural water distribution projects. Development of a Wellhead Protection Plan to identify mechanisms to protect the well fields will be a critical step in identifying protective measures and programs.

OTHER PLANS: Regarding the LCNRD Master Plan, the Project directly protects the water supply and strives for alternative supplies through rural water projects and works to establish expanded or separate systems where economic potential and dedicated local interest warrants such action. The Development of a Wellhead Protection Plan planned with this project will identify mechanisms to protect the well fields and will be a critical step in identifying protective measures and programs as well.

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

The project will replace an unsustainable public water supply source with a sustainable, higher quality public water supply source that will meet the needs of several thousand residents taking advantage of the investments and plans described in the paragraphs above. The usage of the drinking water produced is:

1) Agricultural use for stock and pasture water needs in the rural setting.

2) Residential and industrial use by rural connections and for SIDs across the service area and by homes, businesses, and industries in the communities of Crofton, Fordyce, St. Helena and Crofton.

3) Recreational use by campgrounds, businesses, and other connections along the Lake and River where recreation attracts residents and visitors to the area and supports the economy of the local residents and communities.

List all stakeholders involved in project

The stakeholders in the Source Solution and System Upgrades project are the Lewis and Clark Natural Resources District on behalf of the Cedar Knox Rural Water Project. Additional stakeholders are the communities served by CKRWP, Crofton, Fordyce, St. Helena, and Obert, the SID and housing developments served, and the 900+ rural residents and agricultural producers with connections to CKRWP.

The community stakeholders involved in this project include the current customers and water users of the Cedar Knox Rural Water Project, the residents and landowners of the service area, and landowners of property where the project will be carried out.

LCNRD has primary control over the development of the CKRWP Groundwater Conversion Project with technical input from NDEE who has jurisdiction for state and federal drinking water regulations. UNL-CSD is a stakeholder providing technical input for the project related to groundwater quantity and quality.

Identify who benefits from this project

CKRWP provides drinking water to approximately 3,000 residents in northern Cedar and Knox Counties of Northeast Nebraska. Customers include 4 communities, Crofton, Fordyce, St. Helena, and Obert; more than 900 rural connections; several campgrounds; and several Sanitary Improvement Districts (SIDs) and housing developments including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten, Lewis and Clark Estates, Hideaway Acres, Autumn Oaks, Prairie Ridge, Bon Homme, Cedar Hills and the Becker Addition (Figure 1. page 11).

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.

List the issues or problems addressed by the project and why they should be considered statewide

Sedimentation in Lewis and Clark Lake impounded by Gavins Point Dam is a problem faced by Nebraska and other Missouri River states with infrastructure in the Lake and other lakes along the Missouri River main stem reservoirs. Sedimentation will eventually convert the long-term use of the Lake from one of a lake to one of a braided wetland environment. Because the CKRWP intake is located to the west end of the Lake, east of the existing sediment plume, use of the CKRWP intake will be severely restricted or rendered unusable within an estimated 20 years (Figure 2. page 12). Encroaching sediment in the Lake is a concern for both South Dakota and Nebraska, addressing the concern is the focus of the Missouri Sedimentation Action Coalition (MSAC) (http://www.msaconline.com/). MSAC is working to identify a method to address sediment in the Missouri River main stem reservoirs and to mitigate the loss of authorized purposes. Any work untaken to MSAC or other entities to remedy the sedimentation will have little impact on the current predicament of the CKRWP intake. According to correspondence from the U.S. Army Corps of Engineers (USACE), Omaha District from March 12, 2018 (Attachment G., "in 2011, Lewis and Clark Lake has lost approximately 27% of the original storage. Sediment is continuing to accumulate in the reservoir and river reach upstream of the pool." … "Historical estimates show an average movement of the face of the delta of approximately 500 feet per year." The correspondence further states that "Based on original operations criteria, the project is operating as designed, and therefore no actions to address sedimentation have been performed as part of the normal Operations and Maintenance program for the project. For the foreseeable future, we do not expect a change in the operations and maintenance of Gavins Point Dam and Lewis and Clark Lake."

The MSAC website states that "At some point in time all the Missouri River main stem reservoirs will cease to provide the authorized purposes. At present time there are no plans in place to address operations once the projects fill with sediment or to take action to sustain the reservoirs and benefits." MSAC is working with stakeholders and utilizing technical assistance from the US Army Corps of Engineers (USACE) to develop a sediment management plan for Lewis and Clark Lake. A sediment management plan provides a framework to prevent sediment from reducing water storage capacity at a reservoir and increasing water storage capacity through sediment removal at a reservoir." According to MSAC, Lewis and Clark Lake has already lost nearly 35% of its water storage capacity to sediment.

Flooding and related damages along the Missouri River is a major statewide problem. Impacts from flooding can both directly impact the intake structure and advance sediment in the Lake. Safe drinking water is another statewide issue for all water supply sources in Nebraska.

Describe how the project will address each issue and/or problem

The project addresses each issue by securing a source that is not subject to sedimentation or flooding on the Missouri River and Lewis and Clark Lake and by securing a source (not in violation of state or federal standards) that can meet the long-term needs of the system customers.

Describe the total number of people and/or total number of acres that would receive benefits

CKRWP is a public water system that serves approximately 3,000 residents in northern Cedar and Knox Counties of Northeast Nebraska to a service area of 195,000 acres. Drinking water is provided to 4 communities Crofton, Fordyce, St. Helena, and Obert; more than 900 rural connections; several campgrounds; and several Sanitary Improvement Districts (SIDs) and housing developments including Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten, Lewis and Clark Estates, Hideaway Acres, Autumn Oaks, Prairie Ridge, Bon Homme, Cedar Hills and the Becker Addition.

Identify the benefit, to the state, this project would provide

One benefit to the state is securing service for a rural water distribution system system that meets the drinking water needs is the ability to maintain a healthy viable regional community. One that can support the retention of current residents and one that can attract residents to the state. This is an economic development goal the state shares for this area, as evidenced by the recently passed Lake Development Act and Water Recreation Enhancement Act (LB1023 approved by the Governor April 18, 2022). That Act cited the following: “to catalyze private investment in the region in Knox County, Nebraska, that lies north of State Highway 12 and extends to the South Dakota border and includes Lewis and Clark Lake and Niobrara State Park “ as one of the initial study objectives supporting the decision to invest in future lake access and marina development for the Lake. Another state benefit is the potential for CKRWP to expand the service area or to connect additional communities with the development of a secure source with secured capacity. There are several reasons communities may look for alternatives outside of their existing sources including O&M costs, nitrate contamination, and other costs associated with meeting SWDA requirements.

An additional benefit to the state is achieving goals listed in the 2021 State Hazard mitigation Plan including:

State Hazard Mitigation Plan

Goal 2 – Reduce or eliminate long-term risk to property, including critical facilities and infrastructure, historic, and private property.

Objective 2.3 - Promote resilient and sustainable building to reduce vulnerabilities, encouraging the use of green and natural infrastructure, when appropriate.

Objective 2.4 - Identify opportunities to mitigate vulnerable critical infrastructure, such as utilities, roads and bridges, and other Lifeline-related facilities.

Goal 5 - Build stronger by promoting mitigation actions that emphasize sustainable construction and design measures to reduce or eliminate the impacts of natural hazards.

Objective 5.1 - Encourage building and rebuilding practices that address resiliency through higher standards and sustainable design to resist impacts of natural hazards.

Objective 5.2 - Enhance coordination with state and local agencies that promote resiliency and sustainability.

The placement of the intake is on bedrock. The surrounding area also exhibits bedrock very close to the land surface which makes moving the intake, siting a collector well, or developing a groundwater well near the existing plant infeasible. Figure 3. (page 13) is a cross-section representation of the bedrock and geological features in the Devils Nest area where the intake is located.

The State Hazard Mitigation Plan also serves to break the cycle of repetitive damage by coordinating the implementation of mitigation activities that eliminate or reduce the long-term risk to human life and property from hazards and their effects. If the project is not completed there would ultimately be a regional water system that would not be able to meet long-term water service needs for a significant area of the state.

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.

List other funding sources in a funding matrix and Describe how each source of funding is made available if the project is funded

An American Recovery Plan Act (ARPA) funding award in the amount $7.0 million has been designated for the Source Solution and System Upgrades project through action of the 2022 Nebraska Legislature in LB1014e Section 53. NDEE is the entity responsible for distributing the funds pertaining to this project. The NDEE Drinking Water State Revolving Fund (DWSRF) program administrators have indicated in the annual Intended Use Plan (IUP) that funding will be provided for the project, of the total allocated $10.865 million is for loan forgiveness and the remaining amount is available for loan. NDEE is responsible for distributing DWSRF monies and will reimburse project expenses with receipt of eligible expenses. The amount not covered by ARPA and DWSRF is $14.135 million. CKRWP is requesting 60% of the remaining $14.135 million from WSF which is equal to $8.481 million. CKRWP will utilize DWSRF loan or will issue bonds for all or part of the $5.654 million not covered by other sources. Loan or bond repayment will be made from the water user fees and rates charged to system customers.

Summary of Anticipated Funding Sources
$7 million – American Recovery Plan Act allocation
$10.865 million – State Revolving Fund (SRF) loan forgiveness
$8.481 million – Water Sustainability Fund
$5.654 million – Cedar Knox Rural Water Project – loan through SRF
$32.0 million – Total Project Cost

The Water Sustainability Grant request of $8,481,000 will provide relief on loans or bond debt and debt service. This reduces the need for future water rate increases.

Provide a copy or evidence of each commitment, for each separate source, of match dollars and funding partners

American Recovery Plan Act (ARPA) funding in the amount $7 million has been designated for this project through action of the 2022 Nebraska Legislature in LB1014e Section 53, see confirmation of funding by NDEE in Attachment B. The NDEE Drinking Water State Revolving Fund (DWSRF) designation of $10.865 million is equal to fifty percent of the total allocated amount referenced in the DWSRF program 2022 IUP, http://dee.ne.gov/Publica.nsf/PubsForm.xsp?documentId=8BC9BBC6723662488625873300779B6F&action=openDocument, and confirmed in a letter provided by NDEE which includes support of the Project (Attachment B.).

CKRWP is committed to the Source Solution and System Upgrades project and will provide funding to meet the $5.654 million dollars through an SRF loan or other sources if necessary to complete the project successfully. CKRWP's letter of financial commitment is included in Attachment A. of this application.

Describe how you will proceed if other funding sources do not come through

In the instance, WSF funding is not realized as detailed above, CKRWP will consider seeking additional sources of grant funding or increase the DWSRF loan amount to complete the project. CKRWP is requesting $8.481 million from the Water Sustainability Fund for design, permitting and construction of the long-term water supply system.

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.

Describe how the project will contribute to watershed health and function in detail and list all of the watersheds affected.

Sedimentation and flood mitigation – the ultimate sedimentation and flood mitigation tool available to CKRWP for security of a water source is to remove the infrastructure from Lewis and Clark Lake and convert to a groundwater source away from the risks to the intake structure and associated infrastructure. CKRWP is completely removing the risk experienced in the Lake by relocating the water source to the identified groundwater source of the Dolphin Township well fields. Function of the Lake and Birdsell Creek will be restored when CKRWP is no longer drawing water from the Lake or introducing backwash to the Creek. The primary watershed impacted by ceasing to draw water from the Lake and by ceasing to discharge backwash is the Charley Creek-Lewis and Clark Lake Watershed (HUC 101701010908) although the entire Lewis and Clark Lake Watershed (HUC 10170101) and all downstream watersheds benefit from the change.

Fifty-nine miles of the Missouri River from Gavins Point Dam to Ponca State Park were designated as the Missouri National Recreational River in 1978.The river supports abundant wildlife and is home to three species listed under the federal Endangered Species Act: the *endangered* pallid sturgeon and least tern, and the *threatened* piping plover. The work undertaken by this Project will contribute to the health and function of the Missouri National Recreational River watershed through CKRWP no longer annually drawing 150 million gallons from the Lake to meet drinking water needs. That water will no longer be removed from the Lake and will remain in the Missouri River. At least a portion of that water would contribute to the aquifer storage in the alluvial Lake and River aquifers. The water will be available to other entities for use locally and downstream.

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.

Identify the date of the Annual Report utilized

Annual Report to the Legislature Fiscal Year 2020-2021

List any and all objectives of the Annual Report intended to be met by the project and Explain how the project meets each objective

NeDNR utilizes several of its program areas to implement the state water planning and review process. Following is a list of the NeDNR goals identified in the Annual Plan of Work and a summary of how they will be addressed through this project.

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

This project supports strong state leadership and involvement on a state concern to effectively meet drinking water needs for residents. The decision making process is fully supported by scientific data review to identify a sustainable local water source to meet local needs. Development of the groundwater source in an area where resources are poorly understood required significant scientific investigation using AEM survey, test hole drilling, and observation well development.

Goal: 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.

This project directly addresses flood mitigation through removing the converting from the surface water source in Lewis and Clark Lake to a groundwater source. The NeDNR survey and related services regarding floodplains and flood planning will be updated.

Goal: 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.

The project stems from collaboration between NeDNR, stakeholders and LCNRD/CKRWP to provide long-term sustainability of the water resources.

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

LCNRD has met with the residents directly impacted by this project and will be holding additional meetings with the residents and communities served and/or impacted (stakeholders) by the Cedar Knox Rural Water Project. Frequent interaction between LCNRD, CKRWP and the partners who are responsible for

technical components of the project or provide expertise will be engaged frequently ensuring local and state needs are addressed.

Goal: 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.

This project would be a collaborative investment of multiple entities leveraging funds to secure an alternative groundwater source that will allow continued use of water while converting from the current surface water source. The design and construction phase of the engineering plan includes intensive testing to evaluate and protect existing domestic, stock, and irrigation uses when developing and designing the well fields and their pumping rates. Having a highly optimized rural water system pumping from a small number of wells to meet the needs of several thousand residents and to meet the demand of agricultural and recreational uses is an innovative strategy that minimizes the impact to smaller surrounding aquifer systems when compared to other potential land use developments. This is especially important in the CKRWP area where aquifers are diverse and limited in extent and quality. Development of a Wellhead Protection Plan will identify further mechanisms to protect the sustainability of the resource. The public wells will also be registered with the NeDNR.

Goal: Provide agency-wide services and support in the areas of information technology and transparent data sharing, business process improvement, public information, and administration of state-aid funds in conjunction with the NRC.

If awarded, the project will be part of the state-aid funds (WSF) in conjunction with the NRC that the NeDNR administers. Through that WSF contracting and reporting process, data will be shared with NeDNR (groundwater monitoring data, well field development quantity and quality analysis, compliance analyses), and the outcomes of the Project summarized to the public under the NeDNR WSF website.

The NeDNR and project sponsors share many common goals that aid in the protection of water for agricultural, communities and industries, wildlife and the environment, and recreational users. If funded, the 3,000 residents in the project area will also benefit from those joint agency efforts.

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.

Describe the federal mandate

The CKRWP Source Solution and System Upgrades project addresses the federal law associated with the Safe Drinking Water Act, a federal mandate passed by Congress in 1974. According to Federal Register 388, January 4, 2006, Vol. 71, the Maximum Contaminant Level (MCL) for Total Trihalomethane in drinking water is 0.080 mg/l (ppm), see "Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rule: A Quick Reference Guide at Stage 1 Disinfectants and Disinfection Byproducts Rule: A Quick Reference Guide (epa.gov). In order for CKRWP to operate a public water system, federal law requires that all water provided must not exceed the appropriate MCL as established by the Safe Drinking Water Act.

Provide documentary evidence of the federal mandate

Below is a list of the regulated contaminants, including TTHM and nitrate covered by the Safe Drinking Water Act that CKRWP must comply with:

> ***National Primary Drinking Water Regulations*** *- National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water.*

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[2] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Total Trihalomethanes (TTHMs)	0.080	Liver, kidney, or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[3]
Nitrate (measured as Nitrogen)	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10

The full table of National Primary Drinking Water Regulations is available here: https://www.epa.gov/sites/default/files/2016-06/documents/npwdr_complete_table.pdf

Describe how the project meets the requirements of the federal mandate

This CKRWP Source Solution and System Upgrades project will allow CKRWP to comply with the SDWA requirements by providing a reliable, high quality water supply that is sustainable and significantly reduces the risk of exceeding the MCL for the SDWA regulated disinfection byproduct TTHM. Chlorine disinfection will be significantly reduced with the conversion to groundwater which contains very little organic matter therefore TTHM production will also be significantly reduced which will keep the levels of TTHM concentrations below the allowable limits of the SDWA.

Describe the relationship between the federal mandate and how the project furthers the goals of water sustainability

The federal SDWA includes a legal and fiduciary responsibility to maintain a dependable and adequate supply of safe water to system customers. Therefore, actions to develop a long-term sustainable water supply in place for CKRWP to serve system customers including 4 communities, several SIDs and campgrounds, and more than 900 rural customers is considered a federal mandate.

The federal SDWA recognizes the people served by CKRWP are entitled to safe drinking water. Nebraska Title 179 regulations establish drinking water standards for public water systems as authorized in Neb. Rev. Stat. §§71-5301 to 71-5313. These programs provide for the protection of human health and prevents drinking water health hazards through the control and regulation of public water systems and drinking water testing.

The Source Solution and System Upgrades project will provide a safe, reliable drinking water source that meets the standards of the SDWA for the communities of Crofton, Fordyce, St. Helena, Obert; the SIDs and housing developments of Walker Valley, Devils Nest, Grandview Estates, Kohles Acres, Deep Water, South Yankton, Aten and the Becker Addition; several campgrounds, and more than 900 rural connections. The Source Solution and System Upgrades project also furthers the goals set forth by NeDNR and NRC WSF “by rehabilitation or restoration of water supply infrastructure, new water supply, infrastructure, or water supply infrastructure maintenance or flood prevention for protection of critical infrastructure.”