NEMAHA NRD

APPLICATION PREAPRED BY:

HOUSTON engineering, inc.

Water Sustainability Fund Application
Kirkman's Cove Lake Water Quality Improvement Projects
March 31, 2023

Enclosed in this document, in its entirety, is an application for the Nebraska Natural Resources Commission's (NRC) Water Sustainability Fund that has been divided into four categories.

The **Cover Letter** introduces the project and states the Applicant's intent.

The **Application** follows the format in the Application Form provided by the NRC answering all questions and requests for information in Sections A, B, and C. The responses and information provided are intended to address the information requested as directly as possible.

The Application references the **Supplemental Information Attachment (SIA)** where supporting documentation and additional information is contained. The SIA provides additional data and references to support the responses offered in the Application. The information in the SIA is provided in the same order and is numbered the same manner as in the Application. Note that not all sections of the Application will have information included in the SIA.

At the end of the SIA is a **Bibliography** for all external reports, design guidance or other material referenced in the Application. This Bibliography provides the reviewer with additional references relevant to the Application. The combined size of these references prohibits the inclusion of the references within the SIA. Digital copies of the references can be obtained by contacting Kent Zimmerman at NDNR (kent.zimmerman@nebraska.gov) or Mike Sotak at FYRA Engineering (msotak@fyraengineering.com). The information provided in the Bibliography is alphabetical, but each entry is cross referenced back to the Application/SIA section to which it pertains and is referenced.

COVER LETTER

APPLICATION

SUPPLEMENTAL INFORMATION ATTACHMENT

BIBLIOGRAPHY

COVER LETTER

NEMAHA NRD

HOUSTON engineering, inc.

March 31, 2023

Mr. Tom Riley,

Director, Nebraska Department of Natural Resources

via Electronic Submission

Re: Kirkman's Cove Water Quality Improvements Projects (Project)

Application for Water Sustainability Fund Grant (Application)

Director Riley and members of Natural Resources Commission:

In accordance with the rules, regulations and guidelines for Nebraska's Water Sustainability Fund Grant Program, please accept this grant application on behalf of the Nemaha Natural Resources District (NNRD) for the above-referenced project.

Kirkman's Cove Lake (Lake) appears on Nebraska's 303(d) List of Impaired Waters, which is updated every two years by NDEE as part of the State's Water Quality Integrated Report (IR). The 2020 IR and 303(d) List shows that the lake is impaired by sediment accumulation, Mercury, Chlorophyll a, Nutrients (Total Nitrogen and Total Phosphorus), pH, and E. coli bacteria. The NNRD has developed a Water Quality Management Plan for Kirkman's Cove Lake (WQM Plan) to address the impairments by identifying alternatives in watershed and in the lake that reduce pollutant loading and improve water quality. The WQM Plan identified land conservation practices in the watershed and structural practices throughout the watershed and in the lake. In addition to water quality improvements, these practices have numerous benefits related to reduction in erosion and sediment transport, watershed conservation, land and infrastructure protection, stream stability, aquatic and wildlife habitat, public health and safety, and recreation. The alternatives included in this Project are the structural components identified in the WQM Plan that the NNRD has the authority to construct on public land or with landowner consent on private grounds.

This Project has financial support through the Nebraska Department of Environment and Energy (NDEE) Section 319 through the approved WQM Plan. Additionally, A Preliminary Investigation Feasibility Report (PIFR) request letter was submitted to NRCS in August 2022. If approved, the NRCS is providing permission for the NNRD to complete a PIFR that would provide reasonable assurance that a potential watershed project can be developed that addresses a PL 566 purpose and that there are no apparent insurmountable obstacles to the completion of that project. A Watershed and Flood Prevention Operations (WFPO) plan would be developed with the NRCS that would identify projects and associated costs to be covered under the WFPO program. Best and worst-case scenarios for funding have been in included in the Application. It is not intended that the NNRD will

know the status of the PIFR request letter prior to the Commission meetings, so the worst-case funding scenario is requested.

Through this application and the supporting materials, the benefits of this Project are detailed. This Project includes nine grade stabilization structures, one mile of stream stabilization, an in-lake forebay, and dredging. The value of these structural solutions is greater than the sum of the individual components and the costs and benefits are therefore assessed together as a single Project.

In addition to the application form posted on the NDNR website, which has been copied verbatim into this grant application, there is also an attachment referenced as the Supplemental Information Attachment (SIA) to this application. Contained within the SIA is a bibliography of technical documents related to the project that contain additional information that can be reviewed if desired, including the Draft Plan-EA. In an effort to keep this application as concise as possible, Kent Zimmerman at NDNR will be provided an electronic copy of all of the documents referenced in the bibliography and therefore, copies of said information can be obtained through Mr. Zimmerman. The goal of this application structure was to first provide reviewers with the information required to directly answer the questions in the official application form at a concise level, second to provide additional maps, charts and supporting documents to address the required information in the SIA, and then finally to provide the additional documents that any supporting information provided originates from. We trust that this allows you to quickly review the information you desire and gather additional data as each individual reviewer sees fit.

"Water Sustainability" is defined in Nebraska Title 264 as *water use is sustainable when current use promotes healthy watersheds, improves water quality, and protects the ability of future generations to meet their needs.*

This watershed has a unique and immediate need to address the stream degradation and associated habitat loss in order to protect and restore the watershed. The rapidly eroding and changing nature of the streams within this watershed requires prompt measures to protect the streams, water quality, and future land use of the watershed. And as argued above, finding any project that would more protect the ability of future generations to meet their needs would be difficult, given the protection this project provides to one of Nebraska's important rural communities and unique ecosystems.

We thank you for your acceptance of this application and stand ready to provide any clarification on any information provided during your review.

Sincerely,

Kyle Hauschild

Nemaha NRD General Manager

APPLICATION

NEMAHA NRD

HOUSTON engineering, inc.

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Kirkman's Cove Lake Water Quality Improvement Projects (Project)

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

Sponsor Business Name: Nemaha Natural Resources District

Sponsor Contact's Name: Kyle Hauschild

Sponsor Contact's Address: 62161 Highway 136, Tecumseh, NE 68450

Sponsor Contact's Phone: 402-355-3325

Sponsor Contact's Email: khauschild@nemahanrd.org

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

   Grant amount requested. $ 3,196,704

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

   If a loan is requested amount requested. $ 0

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

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)

Final design and permitting is anticipated to occur from 2024 through 2026. At that time, the required permits for this Project will be obtained. Consultation for Section 7 of the Endangered Species Act with USFWS and NGPC Threatened and Endangered Species consultation will be conducted prior to any work. Any additional required coordination at each specific site will occur during final design. A cultural resources evaluation will be conducted for the Project and consultation with SHPO and potentially impacted Tribes will be completed. A Section 404 permit will be obtained through the US Army Corps of Engineers (USACE) prior to construction. The estimated cost to obtain the permits is estimated to be $100,000 is included in the engineering costs below.

Summary of Costs

Task	Cost
Construction	$ 4,386,800
Engineering	$ 1,316,040
Design/Permitting	$ 877,360
Construction Oversight	$ 438,680
Land Rights	$ -
Project Administration	$ 25,000
Total Costs	**$ 5,727,840**

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☒

National Pollutant Discharge Elimination System (NPDES) Permit from the Nebraska Department of Environment and Energy (NDEE) will be obtained as required for construction projects with more than 1-acre of disturbed land.

4. **Partnerships**

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

Nemaha Natural Resources District (NNRD). See the Professional Services Agreement in the Supplemental Information Attachment (SIA).

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

The NNRD is the sponsor of the Project and is responsible for all contracting for funding, planning, design, and construction.

5. **Other Sources of Funding**

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

The costs associated with the Project are broken out by the components required to complete the Project in the table below. All of the Project costs and the funding breakdown is included in Section A-1 of the SIA. A more detailed breakdown of the construction quantities and cost-estimate is also provided in the SIA Section A-1. Additional funds are being applied for, and federal funding may be acquired. If funding sources are not obtained, NNRD will be responsible for implementing the Project. The NNRD has planned for and budgeted the cost of the design for this Project in their current budget.

EPA Section 319 Grant Program: A Water Quality Management (WQM) Plan has been approved by EPA and the Nebraska Department of Environmental Energy (NDEE) for Kirkman's Cove Lake. The plan identified land management conservation practices in the watershed as well as larger scale structural practices, which funds are being requested for in this WSF application. These components of the plan are eligible for 319 funds that are requested through Project Implementation Plan (PIP) applications. The WQM Plan must be updated every five years in order to remain eligible for 319 funds. Each request can be up to $300,000 at a time. There is no limit to the frequency of PIP applications, but the distribution of funds is limited to the amount of 319 funds Nebraska has available to allocate. A portion of each request must include funds to go towards watershed conservation practices and the remaining can go towards the structural components. The Worst-Case funding breakdown includes limited funds from 319, assuming two PIP requests are approved within the 5-yr eligibility period of the current plan. Each request would be for $300,000 with one third of the request going towards land conservation practices, resulting in $200,000 towards the components included in this application for a total of $400,000 from Section 319. The Best-Case funding breakdown assumes the WQMP is updated for the next 20 years and eight PIP requests (for the same amounts described above), resulting in $1,600,000 towards the components included in this application.

NRCS: A Preliminary Investigation Feasibility Report (PIFR) request letter was submitted to NRCS in August 2022. If approved, the NRCS is providing permission for the NNRD to complete a PIFR that would provide reasonable assurance that a potential watershed project can be developed that addresses a PL 566 purpose and that there are no apparent insurmountable obstacles to the completion of that project. A Watershed and Flood Prevention Operations (WFPO) plan would be developed with the NRCS that would identify projects and associated costs to be covered under the WFPO program. It is anticipated that stream and grade stabilization projects would be funded through WFPO. An estimated cost of $1,047,600 has been included for the Best-Case scenario to reflect a 100% cost share for design and permitting and 75% cost share for construction.

Worst-Case Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$4,386,800	$0	$320,000	$4,066,800	$2,440,080	$1,626,720
Engineering	$1,316,040	$0	$80,000	$1,236,040	$741,624	$494,416
Land Rights	$0	$0	$0	$0	$0	$0
Project Administration	$25,000	$0	$0	$25,000	$15,000	$10,000
Totals	**$5,727,840**	**$0**	**$400,000**	**$5,327,840**	**$3,196,704**	**$2,131,136**

Best-Case Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$4,386,800	$1,047,600	$1,280,000	$2,059,200	$1,235,520	$823,680
Engineering	$1,316,040	$419,040	$320,000	$577,000	$346,200	$230,800
Land Rights	$0	$0	$0	$0	$0	$0
Project Administration	$25,000	$0	$0	$25,000	$15,000	$10,000
Totals	**$5,727,840**	**$1,466,640**	**$1,600,000**	**$2,661,200**	**$1,596,720**	**$1,064,480**

6. **Overview**

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

The Project occurs in the Long Branch Sub-Watershed (watershed), located in Richardson County in Nebraska (see Figure B-1.1 in the SIA). Kirkman's Cove Lake (Lake) appears on Nebraska's 303(d) List of Impaired Waters, which is updated every two years by NDEE as part of the State's Water Quality Integrated Report (IR). The IR documents the Lake's Designated Uses as Primary Contact Recreation, Aquatic Life Warmwater Class A, Agricultural Water Supply Class A, and Aesthetics. The 2020 IR and 303(d) List shows that Aesthetics is impaired by sediment accumulation, Aquatic Life Warmwater Class A is impaired due to high Mercury, high Chlorophyll a, Nutrients (Total Nitrogen and Total Phosphorus), and pH; and Primary Contact Recreation is impaired due to high *E. coli* bacteria. Phosphorus is typically the key nutrient in decreasing algal blooms in Eastern Nebraska lakes, and phosphorus transport to surface water is particularly in agricultural watersheds with high sediment yields.

Kirkman's Cove Lake was identified as a priority area in the 2019 Nonpoint Source Management Plan (NPSM Plan) for the Nemaha River Basin and the Kirkman's Cove Lake WQM Plan has been drafted to provide an implementation plan to improve water quality. Therefore, the Project components included in this WSF application are structural best management practices (BMPs) identified to reduce sediment and phosphorus loads to the Lake. These structural BMPs include a combination of stream stability measures, an in-lake forebay, and dredging. The BMPs were selected based on treatment efficiency for sediment and phosphorus (SIA Table B-1.2) and willingness of landowners to adopt different practices based on responses from outreach efforts during development of the WQM Plan. Approximately 23% of the annual total phosphorus load comes from stream bank erosion and 32% from internal natural causes in the Lake (SIA Table B-1.1), therefore streambank and in-lake measures will address a majority of the phosphorus loading. These measures will improve the water quality of Kirkman's Cove Lake by reducing the amount of sediment and phosphorus entering the Lake. Once achieved, these load reductions will increase water

clarity and reduce or remove the impairments to the Aquatic Life and Aesthetics designated uses. Although the BMPs are focused on sediment and phosphorus to reduce Chlorophyll a and improve water clarity, some improvement in *E. coli* and pH levels is anticipated.

Stream stabilization BMPs would consist of grade and streambank stabilization. Grade stabilization structures will maintain or raise the stream bed elevation to prevent streambed degradation and bank failure, which contribute sediment and phosphorus loads directly to the stream and the downstream Lake. Grade stabilization would occur at road crossings within the county road right-of-way. Bank stabilization measures would armor banks and/or establish vegetation to prevent erosion and the transport of sediment and nutrients downstream. Bank stabilization measures would be implemented in areas where landowners have expressed an interest in participating in such practices. Nine grade control structures would be implemented, and approximately 1 mile of streambanks stabilized on private lands. Successful bank and grade stabilization practices can nearly eliminate stream bed and bank sources of sediment and phosphorus, making them highly effective practices for water quality improvement. Additionally, stabilized streams provide better aquatic health, which has indirect benefits on in-stream and downstream water quality.

The in-lake forebay would impound water at the inlet of the Lake to increase retention time and capture sediment and nutrients before they enter the lake. The in-lake forebay would entail a new earthen embankment with outlet works at the northern end of the lake where Kirkman's Creek enters the Lake. The in-lake forebay was sized to trap 20-years worth of sediment from the watershed and prevent that material from entering the Lake.

Another in-lake BMP is dredging of the lakebed. This would remove accumulated sediments with high nutrient concentrations that have deposited in the Lake. Dredging also increases lake depths that reduce internal pollutant loading by reducing resuspension of sediments cause by wind and wave action that increase turbidity and reintroduce settled nutrients back into the water column. Additionally, the increase in water volume has positive impact on water quality. The in-lake forebay and dredging would occur on NNRD property therefore no land rights would be required.

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.

A description of the tasks to be completed for the Project are as follows:

- Construction: all costs to construct structural practices included stream stabilization, grade control structures, an in-lake forebay and dredging (and associated spoils sites).
- Engineering: final design of the structural practices, surveys, geotechnical investigations, construction observation, and permit acquisition. Engineering costs are based on engineering judgement and similar projects within the state. Construction observation costs are estimated at 10 percent of the construction cost.
- Land Rights: no costs are included for land rights. In-lake forebay and dredging (associated spoils site) occurs on NNRD owned property. The grade control structures will be within the county right-of way. Streambank stabilization measures will occur on willing landowner properties and it is assumed easements will be provided.
- Project Administration: includes project oversight and review, contract administration and supervision.

Annual Cost Breakdown

Project Task	Year 1 (2024)	Year 2 (2025)	Year 3 (2026)	Remaining	Total Amount
Construction	$0	$1,495,000	$1,495,000	$1,396,800	$4,386,800
Engineering	$598,000	$289,180	$289,180	$139,680	$1,316,040
Land Rights	$0	$0	$0	$0	$0
Project Administration	$5,000	$7,500	$7,500	$5,000	$25,000
Total	$603,000	$1,791,680	$1,791,680	$1,541,480	$5,727,840

Timeline assumptions include :

Year 1	Design and permitting of the in-lake forebay and dredging
Year 2	Construction and construction oversight of the in-lake forebay and dredging (Year 1 of 2) Design/permitting of grade controls and stream stabilization (Year 1 of 2)
Year 3	Construction and construction oversight of the in-lake forebay and dredging (Year 2 of 2) Design/permitting of grade controls and stream stabilization (Year 2 of 2)
Remaining	Construction and construction oversight of grade controls and stream stabilization

8. **IMP**

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

Section B.

DNR DIRECTOR'S FINDINGS

Prove Engineering & Technical Feasibility

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

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

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

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

1.A.1 Insert a feasibility report to comply with Title 261, Chapter 2, including engineering and technical data;

The feasibility of Project components was investigated during the development of the WQM Plan. A preliminary design for the in-lake forebay component was completed as part of the WQM Plan, see SIA Figure B-1.3. Grade control and bank stabilization design will follow NRCS standards.

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

The WQM Plan development included a resource inventory and pollutant load modeling phase, an alternatives evaluation, and concept level design sufficient develop preliminary cost estimates.

The resource inventory and pollutant load modeling phase was conducted to gather data, investigate the watershed site, determine the existing pollutant load and required load reduction to meet water quality goals, and formulate feasible alternatives (SIA Tables B-1.1 and B-1.3). Public outreach efforts gathered input on preferred practices and landowner interest. Site assessments were performed at the identified sites to gather information about the site conditions and specific design needs at each site.

The alternatives evaluation assessed the alternatives for their contributing impacts to load reductions (SIA Table B-1.2) and cost effectiveness. Alternatives were evaluated for technical feasibility, social acceptance, financial constraints and opportunities, reduction efficiency, and staff/personnel availability. A final set of alternatives were identified that in combination would achieve the required load reductions to meet water quality goals. These are documented in the WQM Plan.

Conceptual level design and cost estimations was determined for each structural component. Design was guided in accordance with the NRCS practice standards and supporting documents. Hydrologic investigations were performed for the in-lake forebay, and subsequent investigation will be required for each structural component during the final design phase.

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

On-site investigations were conducted by the owner and Houston Engineering, Inc. to collect visual observations and gain an understanding of the site-specific needs. Locations for grade control structures were identified during field investigations. Site analysis determined the location for the in-lake forebay and an Environmental Review, including a wetland delineation, was conducted in 2015 specifically for this component.

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

Location maps have been inserted into the SIA as Figures B-1.1 to B-1.4. There are numerous maps, tables, etc. that help to define the Project and need and show design intent. They are included throughout the SIA and in the WQM Plan.

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

Water rights in the watershed are typically uncontended. There are no water rights will be impacted by this Project. The NNRD has storage rights for Kirkman's Cove Lake and the Lake is on NNRD property. Sites for grade control structures will be within county roads' right-of-way. Bank stabilization will occur on the property of willing landowners. The NNRD does not anticipate any resistance, as the landowners are aware and in favor of the proposed structures.

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

The final plan includes a combination of the following structure types. Please see Figures B-1.2-4 in the SIA for the locations of each type of structure.

Streambank Stabilization: These measures will consist of streambank hard armoring or establishing vegetation sufficient to prevent erosion and the transportation of sediment and nutrients to the stream. Hard armoring would entail Class C rock riprap along degraded streambanks. There will be one mile of streambank stabilization implemented on willing landowner property.

Grade Stabilization: These measures would occur at existing county road stream crossings. They would entail weirs or other structures to pin or raise stream bed elevation to prevent incision and associated bank failure. Nine locations for these structures have been identified.

In-Lake Forebay: This would entail a new embankment with outlet works designed to minimize embankment height and temporary ponding extents. This includes a 12" pipe to control the permanent pool and a 95' hard armored weir spillway to safely pass the 10-yr event. The earth embankment will be vegetated with a gentle backslope that could withstand overtopping. This will also involve a levee embankment to protect the existing golf course from temporary inundation. Storage capacity will be raised 3ft above the main Lake water surface elevation, which can be achieved through excavation of accumulated sediment upstream of the embankment.

Lake Dredging: Dredging will remove sediment accumulated in the lake. These efforts would target the area upstream of the old roadway through the lake where the majority of sediments have likely accumulated, including the area behind the in-lake forebay. This will increase the sediment storage capacity of the structure in addition to removing phosphorus-laden sediment that can be released to the water column. Dredging depth will restore the original lake depths or achieve a minimum depth of at least 6 ft in all off-shore areas. Dredged sediment will be transported to a spoils site near the Lake, where sediment will be safely stored and stabilized. The proposed spoils site has more capacity than required and could therefore be used to store future dredged spoils.

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

A geologic investigation will not be required for the Project. If any is required, costs would be covered under project engineering.

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

The in-lake forebay was designed using the HEC-HMS program to run hydrologic storms to set elevations for the auxiliary spillway and top of dam. Precipitation data was obtained from National Oceanic and Atmospheric Administration (NOAA) and the curve number and time of concentration inputs for the HEC-HMS model was calculated using NRCS TR-55 Urban Hydrology for Small Watersheds (TR-55) methodology. The capacity was calculated using the NRCS Soil Conservation Service (SCS) Runoff Curve number method. The design capacity of the pipe was determined using the HEC-HMS program at 1-foot diameter. The auxiliary spillway design capacity was determined using the HEC-HMS program to adequately pass the 10-year event. The table below

summarizes the design storms that were modeled and are used to size the site in accordance with the NRCS Conservation Practice Standards.

Project Design Storms

	In-Lake Forebay
Permanent Pool	20-year lifespan
Auxiliary Spillway	N/A
Top of Dam	10-year, 24-hour

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).

The designs for each structure will adhere to, as a minimum, the requirements in the Nebraska NRCS Conservation Practice Standards for each practice code, as applicable. Survey will be required during final design due to the highly erosive and quickly evolving nature of streams within the watershed. The locations and size of the proposed structures is subject to change based on the results of these surveys. The hydraulic and hydrology will need to be revisited during final design.

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

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

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

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

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

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).

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.

Land management practices such as no-till and cover crops can be effective at reducing erosion and nutrient loss from the landscape. These practices can

remove sediment with 70% to 90% efficiency and 29% to 80% for phosphorus. This is similar to the removal efficiencies of the grade control and stream stabilization measures (SIA Table B-1.2); however, land management practices require private landowner implementation. While the NNRD includes education and outreach in their watershed management improvement efforts, they cannot control how the landowners manage their land. The NNRD has the opportunity to trap and treat pollutant loads from large land areas with the in-lake forebay that they can implement on their park property.

Other structural BMPs were also considered in the WQM Plan. These include sediment control basins, grassed waterways, terraces, riparian buffers, existing terrace improvements, existing basin restoration, and low hazard dam restoration. These practices range from 10% to 90% removal efficiency for sediment and 10% to 80% for phosphorus. Similar to the land management practices, these require landowner implementation onto private land the NNRD does not have the authority to perform. Additionally, these structural practices have land requirements that remove land from production, which can make it harder to encourage landowner participation.

A potential in-lake BMP is alum application. This practice is only effective at removing phosphorus and has no impact on sediment. Dredging of the lake has high phosphorus removal efficiency and also offers other benefits of improved boating safety and recreational opportunities due to sediment removal.

These practices are either not feasible for the NNRD to pursue or do not fulfill the water quality goals, as those that are included in the Project do.

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

   Construction costs were developed based on preliminary design quantities and apply the most current commodity prices based on recent/relative construction bid tabs. Engineering costs were estimated to account for expected design, permitting and construction oversight. With no land rights costs, the remaining costs are associated with project administration required to orchestrate Project implementation.

   Benefits for this Project are mostly intangible, meaning that these benefits that cannot be expressed in monetary terms because of the difficulty in annualizing benefits due to the nature of benefits. This application focuses on the intangible benefits and includes costs associated with benefits that are known.

The benefits from this Project can be organized into ecosystem services, as defined in the United States Department of Agriculture (USDA) in Design Manual 9500-013 (see SIA). described below and associated benefits from this Project that fall under each type of ecosystem service.

Project Ecosystem Services

Ecosystem Services	Project Benefits
Provisioning services: tangible goods provided for direct human use and consumption, such as food, fiber, water, timber, or biomass.	Reduced Erosion and Sedimentation
	Land and Infrastructure Protection
Regulating services: maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe – examples include flood and disease control, water filtration, climate stabilization, or crop pollination.	Water Quality Improvements
	Regional Water Management Plans
Supporting services: refer to the underlying processes maintaining conditions for life on Earth, including nutrient cycling, soil formation, and primary production.	Stream Stabilization and Improvements
	Improved Public Health & Safety
Cultural services: make the world a place in which people want to live – recreational use, spiritual, aesthetic viewsheds, or tribal values.	Improved Fish and Wildlife Habitat
	Improved Recreation

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 summary of all initial capital costs related to the Project are presented in the table below, and a more detailed breakdown of the construction costs are provided in the SIA Tables A-1.2a-c. The Project life is 20-years, although many structures are designed to last longer than 20-years. Annual operation and maintenance costs were assumed to be 0.75% of construction costs calculated over 20 years.

Cost Summary

Summary of Capital Costs		
Construction	$	4,386,800
Engineering	$	1,316,040
Land Rights	$	-
Project Administration	$	25,000
Total	**$**	**5,727,840**

	Annual Cost	Lifetime (yrs)	Total
Operation and Maintenance	$32,900	20	$658,000

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

Benefits for this Project are intangible, meaning that the benefits cannot be expressed in monetary terms because of the difficulty in annualizing benefits due to the nature of benefits. It is difficult to predict the year and costs of the received benefits from this Project due to the types of benefits and unpredictable nature of the benefitted streams.

Reduction in erosion and sediment: The grade and streambank stabilization measures will protect the upstream channels from erosion at the proposed stabilization measure locations. The in-lake forebay and sediment basin will capture and store accumulated sediment.

Land and infrastructure protection: Land and infrastructure will be protected through stabilized streambanks that will protect from loss of land and nearby structures. Stream crossings will be protected through grade stabilization.

Water Quality Improvements: Water quality will be improved due to a reduction in sediment and associated nutrients, including phosphorus and nitrogen, and bacteria, from traveling downstream through streambank stabilization and sediment trapping structures.

Regional Water Management Plans: This Project will support the 2023 Draft WQM Plan implementation strategy by implementing in-lake BMPs and stream stabilization projects for stream rehabilitation and improved water quality. It will also support the 2019 Nemaha Basin Nonpoint Source Management Plan which identified Kirkman's Cove Lake as a priority area.

Stream Stabilization and Improvements: This Project will restore and improve streams within the watershed. This alternative would provide grade stabilization, headcut progression prevention, and stream restoration measures in the streams and therefore improve overall stream function, improving aquatic and terrestrial habitat and human safety. The upstream benefits would be reflected in improved Nebraska Stream Condition Assessment Procedure (NeSCAP) scores. Without protection from this Project, the protected stream's NeSCAP scores would likely decrease due to the increased degradation that would result in lowered hydraulic conveyance from increased down-cutting and bank failure, poor in-stream

habitat, and reduced floodplain connectivity. This Project would protect additional stream reaches through decreased sediment transport downstream of the Project measures. These downstream reaches would benefit from decreased sedimentation, which would protect water quality from increased nutrients and reduce potential burying and disturbance to habitat features such as cobbles, pools, and snags.

Improved Public Health and Safety: Safety will be improved due to protection of homes and public infrastructure such as stream crossings and roads. Stabilization of stream banks and gullies within the watershed will minimize degradation and erosion and therefore provide a moderate, permanent improvement to public safety in and near the streams within and upstream of the Project areas. This will prevent streams from encroaching on local residences, lowering the risk to loss of life and damage to homes. Additionally, proposed stream stabilization measures are designed to protect specific and upstream road crossings and roads. Protecting road crossings and roads from damage will provide safety benefits to pedestrians who use those facilities. Public health and safety will also be improved with as the in-lake forebay will help capture and prevent *E. coli* from entering Kirkman's Cove Lake, which has a Designated Use of Primary Contact Recreation. Dredging of the Lake will also improve boater safety as the overall depth will be increase.

Improved Fish and Wildlife Habitat: In-stream and in-lake aquatic habitat will benefit from improved stream conditions and water quality. This Project will improve in-stream fish habitat by reducing nutrient loads in streams and the Lake, particularly nitrogen and phosphorus, which are currently impairing the Designated Use of Warmwater A Aquatic Life. This alternative would additionally provide grade control along streams, enhancing overall stream function and consequently improve in-stream fish habitat.

Recreation: Kirkman's Cove Lake has great recreational value to the area as it is the largest lake within the Big Nemaha River Watershed. NNRD estimates that between 4,000 to 5,000 visitors come to Kirkman's Cove Recreation area a year, which hosts a realm of outdoor and aquatic based activities. Recreational activities such as boating and fishing will benefit from improved water quality in the Lake. High concentrations of phosphorus and nitrogen in the lake have resulted in excessive algae growth which degrade its recreational value. Reducing these nutrients as well as other sediment and contaminates will improve the Lake's useability for boating and other primary contact recreation. Dredging of the Lake also allows for safer boating. Improved water quality in the Lake will also improve aquatic life habitat therefore improving its value as a fishery.

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).

No annual cash flow is required due to the non-monetary benefits from the Project.

3.D In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.)

The Project will increase water sustainability but the majority of benefits from this Project are intangible. These benefits are largely intangible due to their inability to be expressed in monetary terms due to the nature of benefits and difficulty in assigning costs and annualizing benefits. This application focuses on the intangible benefits. To demonstrate economic feasibility, the benefits are described qualitatively in Section B-3(b) in this application. When available, quantitative values were given to describe the benefits from this Project.

Detailed analysis was performed for this watershed to identify all possible alternatives for the WQM Plan. The practices that are feasible for the NNRD to pursue and that would contribute to meeting the water quality goals were pursue for this Project. The practices that are not feasible for the NNRD to pursue because they need to be implemented by private landowners or those that don't contribute as effectively towards the project goals would cost approximately $7.3 million dollars to achieve similar load reduction (see WQM Plan).

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.

The NNRD has planned for and budgeted the next steps of this Project in their current budget, as reported in their upcoming fiscal budgets. Their proposed FY24 budget is slated to be approved at the Month 2023 Board meeting.

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

The NNRD includes operations and maintenance costs into annual budgets prepared each year. Replacement costs are included in the construction costs, budgeted for in their annual budget.

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

A loan is not involved.

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

Sites for streambank stabilization will be selected in areas that will have little or no impact on wetlands and other aspects of the natural environment. Prior to construction of Project components, on-site environmental field investigations will be completed to determine the location of wetlands and other Waters of the United States (WOUS). The investigation will look at wetland characteristics including prevalence of hydrophytic vegetation, permanent or periodic inundation or saturation, and hydric soils. A desktop review will also be conducted that will included investigating soil types within the Project areas, the National Wetlands Inventory, topographical maps, and aerial photography. Wetlands will be identified and mapped and impacts to these will be avoided to the extent possible. When necessary, impacts to wetlands will be mitigated according to regulations. Additionally, it is anticipated that wetlands will establish approximately 2-feet vertically above and below the new permanent pool elevation of the in-lake forebay. Implementation of stream stability measures are expected to facilitate wetland creation and the combination of grade stabilization type structures will protect the destruction of existing wetlands by halting existing stream degradation. The impacts to wetlands are considered relatively small and this alternative is overall expected to provide a moderate, long-term improvement to wetlands within the watershed.

Impacts to threatened and endangered species will be avoided by consulting with NGPC and the USFWS when necessary and implementing conservation measures to protect any identified species of concern.

An NPDES permit for disturbed acres will be obtained, and a Stormwater Pollution Prevention Plan (SWPPP) will be developed to ensure minimal sediment transport from the site to the adjacent waterway.

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

The NNRD is a regional government agency that focuses on conserving, sustaining, and improving natural resources and the environment. This Project aligns with the types of projects that align with NNRD's roles and have a history of successful implementation, operation, and maintenance. Easements will be provided by landowners for structures on private lands so that the NNRD will have access to all Projects. All permits will be acquired to ensure all legal facets of the Project have been covered.

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

Neb. Rev. Stat. §2-1506 describes the Water Sustainability Fund goals. This Project fulfills multiple goals stated below:

- Contribute to multiple water supply management goals including flood control, reducing threats to property damage, agricultural uses, municipal and industrial uses, recreational benefits, wildlife habitat, conservation, and preservation of water resources.
- Provide increased water productivity and enhance water quality

Reducing threats to Wildlife Habitat
This Project is expected to provide moderate, long-term improvement to wetlands within the watershed. Wetlands are predicted to establish approximately 2-feet vertically above and below the permanent pool elevation at the in-lake forebay. Implementation of stream stability measures, especially in the headwaters of the watershed, are expected to facilitate wetland creation and therefore, improve wildlife habitat. Structures that provide grade stabilization benefits will also protect the destruction of existing wetlands by halting existing stream degradation. This Project would additionally improve in-stream and in-lake fish habitat by improving water quality within the streams and Lake through the reduction of sediment and nutrients entering the waterbodies. The Project would additionally provide grade control along streams, enhancing overall stream function, improve water quality and consequently improve fish habitat.

Conservation and Preservation of Water Resources
Preservation of water resources is achieved by this Project through streambank stability and water quality improvements. The Project contains several structures that offer stream bank protection and grade control, which stabilize streams and protect and enhance the streams. This Project will additionally improve water quality through stabilizing streams, which would reduce stream erosion and therefore, reduce the influx of sediment and associated nutrients to downstream waterbodies. Water quality will also be improved by the in-lake forebay, which traps sediment that would otherwise enter downstream waterbodies. Dredging of the Lake will remove accumulated sediment and reduce in-lake nutrient loading. The 2023 Draft Water Quality Management Plan identified stream stabilization, grade control, an in-lake forebay, and lake dredging as priority practices to improve water quality within the watershed. This Project will work in conjunction with water quality plans to improve water quality within the watershed.

Recreation
Sedimentation, erosion and the associated decreased water quality and decreased fish and wildlife habitat in streams and the Lake within the watershed pose a threat to recreationally significant activities such as fishing and boating. This alternative would improve in-stream and in-lake fish habitat, resulting in improved fishing within the watershed. Primary contact recreational use of the Lake will be improved by improving the water quality. Boating will also be improved through the dredging of the Lake by deepening the Lake and

increasing boater safety. Additionally, the grade stabilization and streambank protection measures will preserve streams within the watershed will protect the recreational use of streams for fishing. This Project reduces the influx of sediments and associated nutrients into the streams and Kirkman's Cove Lake thereby helping to protect water quality and ensure recreation opportunities will continue into the future.

Reducing threats to Property Damage
Stream degradation and widening are common throughout the watershed and can lead to loss of land, infrastructure damage, and interruptions to essential services. This Project would stabilize stream banks and crossing within the watershed to minimize degradation and erosion and protect from loss of land.

Improved Water Quality
This Project will improve water quality in Kirkman's Cove Lake and streams within the watershed by preventing erosion of streams which leads to sediment and nutrients entering waterbodies. The in-lake forebay addresses sediment and nutrients that are transported to the Lake by increasing retention time and inducing settlement of sediment and nutrients prior to reaching the main body of the Lake. Dredging of the Lake will remove sediment and nutrients that have already accumulated, thus reducing the amount of resuspension of sediments. This Project will improve water quality by reducing the amount of sediment and nutrients in the waterbodies.

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.

The in-lake forebay and dredging will occur on NNRD property and grade control structures will be installed within road right of ways. NNRD will obtain easements for construction and maintenance access. NNRD does not currently have the easements and will work with landowners throughout the watershed to identify the specific project locations for stream stabilization. The stream stabilization included in this Project is located on lands with owners who have participated in past adoption of best management practices and anticipate willingness to continue to work with the NNRD on water quality improvements.

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

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

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

This Project falls directly in line with the roles and responsibilities of the NNRD. The NNRD will obtain all necessary permits and land rights to complete the Project to obtain the authority needed to perform work on their own property. The NNRD has the power of eminent domain that could be applied if necessary.

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

Without this Project, water quality would continue to degrade within the Lake and watershed streams. Without the proposed in-lake forebay, dredging, and streambank and grade stabilization measures of this Project, there will be continued influx of sediment and nutrients to the streams and Kirkman's Cove Lake. These proposed measures will therefore, reduce sediment, nutrients, and bacteria transport downstream.

Additionally, stream degradation and widening will continue throughout the watershed and result in loss of land. Progressing stream degradation will continue to reduce floodplain connectivity, bedful diversity, and result in wider and warmer streams, thus leading to reduced habitat for fish and other aquatic and terrestrial species. This would additionally result in potentially significant loss of land and infrastructure and road crossings will continue to worsen.

As discussed in B.3 above, there are benefits to streams, erosion and sedimentation, wildlife habitat, water resources, recreation, infrastructure and property, public health and safety, and water quality that would not be realized if this Project is not completed. There are no negative long-term consequences of this Project. Temporary impacts would include land disturbance that increases erosion and sediment transport but will be minimized with the installation of stormwater pollution prevention measures.

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.

   Kirkman's Cove Lake is listed as impaired due to high levels of E. Coli bacteria and nutrients in the Water Quality Integrated Report (2020 IR). By virtue of reducing stream erosion and trapping or removing sediments, nutrients, and

bacteria this Project will improve downstream water quality of raw water drawn for potable use. It will additionally lower risk for contaminates into groundwater.

Drinking water in this area comes predominantly from groundwater sources. The lake is located within a shallow aquifer area therefore the potential for surface water contaminates to leach into groundwater is high. The area around the downstream town of Humboldt, with a population of 800 according to the 2020 census, is in a Phase II Groundwater Quality Area due to nitrate levels in groundwater that have historically tested higher than the EPA's recommendations for safe drinking water. This Project will reduce the amount of nutrients in the Lake and streams that could contribute to poor groundwater quality.

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

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

   The NNRD and Nebraska Department of Natural Resources (NDNR) jointly adopted a Voluntary Integrated Management Plan (IMP) in May of 2022, The NNRD and NDNR jointly adopted a voluntary Integrated Management Plan in May of 2022. Actions to meet the goals and objectives of this IMP are underway. The goals of the IMP are to protect water users and their investments and interests through improving the understanding of water supplies and uses, protecting existing users, and communicating water resource information. The ultimate goal of the integrated management plan process is to protect existing investments and interests while facilitating economic growth and well-being across the District. Specifically, Goal 2 of the 2022 IMP is to prevent or mitigate water-related conflicts within the District.

   This Project will help achieve the goals of the IMP by protecting water resources within the watershed. Preservation of water resources is achieved by this Project through water quality improvements. If surface water quality is impaired, it can also cause groundwater quality impairments. Degraded surface water quality for agricultural use may also lead to higher demand for groundwater. These issues can contribute to conflicts between groundwater and surface water users. Additionally, improving water quality of the Lake also helps protect investments related to its designated uses. Maintaining recreational use of the Lake and aquatic life habitat also facilitates economic growth within the NNRD. The IMP was recently established and therefore minimal work has been completed to achieve the goals of the plan since it was finalized in 2022. The NNRD has

completed all the tasks, stakeholder meetings, and hearings to obtain the approved IMP.

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

   List the following information that is applicable:

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

   This Project will provide minimal amounts of recharge and reduction of aquifer depletion as permanent impoundments are not large in scale. The in-lake forebay will create a larger permanent pool at Kirkman's Cove Lake. The increase of the permanent pool increases aquifer recharge and infiltration by artificially increasing the available head in the pool area. There is also the potential for a groundwater mound to form below the structure to help recharge the aquifer. The groundwater mound will first form directly below the reservoir and then expand along the periphery and feed neighboring aquifers. Kirkman's Cove Lake and much of its watershed is within a shallow aquifer area meaning any seepage induced from the in-lake forebay may reach the aquifer in a relatively short amount of time. Because the Project is not specifically a recharge project that measured volume and area, it is difficult to quantify and is subject to current conditions. Cross-basin benefits are not anticipated.

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.

   Conservation and Preservation of Water Resources

   Preservation of water resources is achieved by this Project through streambank stability and water quality improvements. The Project contains several structures that offer stream bank protection and grade control, which stabilize streams and protect and enhance the riparian corridor, which also provides aquatic and terrestrial wildlife benefits. This Project will additionally improve water quality through stabilizing streams, which would reduce stream erosion and therefore, reduce the influx of sediment and associated nutrients to downstream

waterbodies. Water quality will also be improved by the in-lake forebay, which traps sediment that would otherwise enter downstream waterbodies. Dredging of the Lake will remove accumulated sediment and reduce in-lake nutrient loading. The 2023 Water Quality Management Plan identified stream stabilization, grade control, an in-lake forebay, and lake dredging as priority practices to improve water quality within the watershed. This Project will work in conjunction with water quality plans to improve water quality within the watershed. Without this Project, erosion and sedimentation would continue to increase and threaten water quality.

Reducing threats to Wildlife Habitat

This Project is expected to provide moderate, long-term improvement to wetlands within the watershed. Wetlands are predicted to establish approximately 2-feet vertically above and below the permanent pool elevation at the in-lake forebay. Implementation of stream stability measures are expected to facilitate wetland creation and therefore, improve wildlife habitat. Structures that provide grade stabilization benefits will also protect the destruction of existing wetlands by halting existing stream degradation. This Project would additionally improve in-stream and in-lake fish habitat by improving water quality within the streams, the riparian corridor, and the Lake through the reduction of sediment and nutrients entering the waterbodies. The Project would additionally provide grade control along streams, enhancing overall stream function, improve water quality and consequently improve fish habitat.

Recreation

Sedimentation, erosion, and the associated decreased water quality and decreased fish and wildlife habitat in streams and the Lake within the watershed pose a threat to recreationally significant activities such as fishing and boating. This alternative would improve in-stream and in-lake fish habitat, resulting in improved fishing within the watershed. Primary contact recreational use of the Lake will be improved by improving the water quality. Boating will also be improved through the dredging of the Lake by deepening the Lake and increasing boater safety. The in-lake forebay will help capture sediment that would otherwise enter the lake thus improving water quality and reducing sedimentation which will preserve lake depth and protect these recreational opportunities. Additionally, the grade stabilization and streambank protection measures will preserve streams within the watershed that will protect the recreational use of streams for fishing. This Project reduces the influx of sediments and associated nutrients into the streams and Kirkman's Cove Lake thereby helping to protect water quality and ensure recreation opportunities will continue into the future.

Reducing threats to Property Damage (Agricultural Lands)

Stream degradation and widening are common throughout the watershed and can lead to loss of land, infrastructure damage, and interruptions to essential services. This Project would stabilize stream banks and crossing within the

watershed to minimize degradation and erosion and protect from loss of land, which is primarily agricultural throughout the watershed.

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

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

This Project will improve water quality through stabilizing streams, which would reduce stream erosion and therefore, reduce the influx of sediment and associated nutrients to downstream waterbodies. The Project's in-lake forebay will also trap sediment that would otherwise enter downstream waterbodies. Additionally, dredging of the Lake will remove sediments, deepen the lake and prevent resuspension of accumulated sediments. All of these measures will improve the water quality of watershed streams and the Lake. The 2023 Water Quality Management Plan identified these as priority practices to improve water quality within the watershed. This Project will work in conjunction with past water quality plans to improve water quality within the watershed.

Kirkman's Cove Lake is designated as having Primary Contact Recreation beneficial use according to the 2020 IR. This means that they are used, or have a high potential to be used, for recreational activities where the body may come into prolonged contact with the water. Other beneficial uses for streams within the watershed includes Class A Warmwater Aquatic Life, Class A Agriculture Water Supply, and Aesthetic Beneficial Use. Improved water quality will increase all beneficial uses listed above for the Lake in the following ways:

- The Project will stabilize streams to protect from future degradation and widening. Mitigating these processes will improve the Aesthetic and Warmwater Aquatic life by reducing sediment transport, which makes water turbid and buries beneficial substrates needed to support aquatic organisms.
- Much of the watershed's recreational opportunities include water-based recreation such as fishing and boating. The residents will benefit from improved water quality and improved fishing in the Lake.
- The Class A Agricultural beneficial use means that it is used for general agricultural purpose without treatment. Most residents in this area would benefit from improved water for agricultural purposes, including irrigation and livestock watering.
- Landowners adjacent to streams will benefit from reduced bank erosion (both lateral migration and widening), which results in loss of land and costly maintenance.

- Stream stabilization will benefit the entire riparian corridor, which provides important habitat and additional water quality benefits (in comparison to unhealthy riparian corridors damaged by erosion.
- This Project will not reduce any beneficial uses.

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.

A cost summary table detailing all of the costs for the proposed Project is provided in a summary table in SIA Section A-1. There are no expected land and water acquisition costs since it is predicted to be able to obtain easements. This Project is cost-effective due to the significant amount of intangible benefits that this Project provides.

Benefits for this Project are mostly intangible, meaning that the majority of benefits cannot be expressed in monetary terms because of the difficulty in annualizing benefits due to the nature of benefits. It is difficult to predict the year and costs of the received benefits from this Project due to the types of benefits and unpredictable nature of the benefitted streams and water quality improvements. A description of the benefits from the Project are described below:

Reduction in erosion and sediment: The grade and streambank stabilization measures will protect the upstream channels from erosion at the proposed stabilization measure locations. The in-lake forebay and sediment basins will capture and store accumulated sediment.

Land and infrastructure protection: Land and infrastructure will be protected through stabilized streambanks that will protect from loss of land and nearby structures. Most land adjacent to streams is used for agriculture or ranching and landowners will benefit from protection of land used for crops and livestock. Quantifying the threats to land and public and private infrastructure is technically difficult to impossible. The potential value of cost-savings were not calculated from reduced threats to property damage and infrastructure since a benefit to cost ratio is not required due to the intangible project benefits. Stream crossings on county roads will be protected through grade stabilization.

Water Quality Improvements: Water quality will be improved due to a reduction in sediment and associated nutrients, including phosphorus, nitrogen, and bacteria, from traveling downstream through streambank

stabilization and sediment trapping structures. This Project will work in conjunction with past water quality plans to improve water quality within the watershed.

Regional Water Management Plans: This Project will support the 2023 Water Quality Management Plan (WQMP) implementation strategy by implementing water quality improvement practices identified in the Plan. It will also support the 2019 Nemaha Basin Nonpoint Source Management Plan, which identified Kirkman's Cove Lake and watershed as a priority area.

Stream Stabilization and Improvements: This Project is designed to restore and improve streams within the watershed. This alternative would provide grade stabilization, headcut progression prevention, and stream restoration measures in the streams and therefore improve overall stream function, improving aquatic and terrestrial habitat and human safety. This Project will protect approximately 306,800-feet of stream upstream of the proposed grade stabilization measures. The upstream benefits would be reflected in improved Nebraska Stream Condition Assessment Procedure (NeSCAP) scores. Without protection from this Project, the protected stream's NeSCAP scores would likely decrease due to the increased degradation that would result in lowered hydraulic conveyance from increased down-cutting and bank failure, poor in-stream habitat, and reduced floodplain connectivity. Downstream reaches will benefit from decreased sedimentation, which would protect water quality from increased nutrients and reduce potential burying and disturbance to habitat features such as cobbles, pools, and snags.

Improved Public Health and Safety: Safety will be improved due to protection of homes and public infrastructure such as stream crossings and roads. Stabilization of stream banks and gullies within the watershed will minimize degradation and erosion and therefore provide a moderate, permanent improvement to public safety in and near the streams within and upstream of the Project areas. This will prevent streams from encroaching on local residences, lowering the risk to loss of life and damage to homes. Additionally, proposed stream stabilization measures are designed to protect specific and upstream road crossings and roads. Protecting road crossings and roads from damage will provide safety benefits to pedestrians who use those facilities. Public health and safety will also be improved with as the in-lake forebay will help capture and prevent *E. coli* from entering Kirkman's Cove Lake, which has a Designated Use of Primary Contact Recreation. Dredging of the Lake will also improve boater safety as the overall depth will be increase.

Improved Fish and Wildlife Habitat: In-stream and in-lake aquatic habitat will benefit from improved stream conditions and water quality. This Project will improve in-stream fish habitat by reducing nutrient loads in streams and the

Lake, particularly nitrogen and phosphorus, which are currently impairing the Designated Use of Warmwater A Aquatic Life. This alternative would additionally provide grade control along streams, enhancing overall stream function and consequently improve in-stream fish habitat.

Recreation: Kirkman's Cove Lake has great recreational value to the area as it is the largest lake within the Big Nemaha River Watershed. NNRD estimates that between 4,000 to 5,000 visitors come to Kirkman's Cove Recreation area a year, which hosts a realm of outdoor and aquatic based activities. Recreational activities such as boating and fishing will benefit from improved water quality in the Lake. High concentrations of phosphorus and nitrogen in the lake have resulted in excessive algae growth which degrade its recreational value. Reducing these nutrients as well as other sediment and contaminates will improve the Lake's useability for boating and other primary contact recreation. Dredging of the Lake also allows for safer boating. Improved water quality in the Lake will also improve aquatic life habitat therefore improving its value as a fishery.

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.

Section 303(d) of the Environmental Protection Agency's Clean Water Act is required to maintain the integrity of the Nation's waters and requires states to establish a list of impaired waters that do not meet water quality standards. Once on the 303(d) list of impaired waters, it is required that a Total Maximum Daily Load (TMDL) report is developed to set goals and pollutant load reductions required for the water body to meet water quality standards. The NDEE 2020 IR lists Kirkman's Cove Lake on the 303(d) list of impaired waters for *E. coli,* nutrients (phosphorus and nitrogen), and sediment.

The water quality benefits from this Project will contribute to reductions in the *E. coli*, nutrient, and sediment loads in the Lake. This will be achieved through implementation of the in-lake forebay that captures sediment and associated nutrients and bacteria before they enter the Lake. Streambank and grade stabilization will additionally reduce the amount of erosion and sediment and sediment-attached (primarily phosphorus and *E. coli*) pollutant loads. This Project will help meet the goals of the TMDLs.

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.

Grade stabilization projects located at county road crossing throughout the streams within the watershed would offer protection from impending headcuts and degrading streams to several stream crossings. Risks to stream crossings pose a significant threat to public safety and providing grade stabilization benefits will reduce risks to damages to crossings.

The Project provides grade control benefits by stabilizing the streambed and therefore, protecting headcuts from moving further upstream which would otherwise cause the stream to degrade and widen. Properties upstream of proposed grade stabilization projects will benefit from protection from loss of land due to stream widening. Road crossing infrastructure over creeks in the watershed is at risk or already experiencing damage due to the stream incision and erosion. Most land adjacent to streams is used for agriculture or ranching and landowners will benefit from protection of land used for crops and livestock. Quantifying the threats to land and public and private infrastructure is technically difficult to impossible, but a list of critical road infrastructure that would benefit from stream and grade stabilization are listed below.

Structures in Watershed

Location	Structure
Kirkman's Creek – 629 Ave Road Crossing	Metal frame bridge
Kirkman's Creek – 630 Ave Road Crossing	Concrete bridge with wooden footings/abutments
Kirkman's Creek – 716 Road Crossing	Wooden bridge
Kirkman's Creek – 717 Road Crossing	Metal frame bridge
Kirkman's Creek – 718 Road Crossing	Wooden bridge
Kirkman's Creek – 719 Road Crossing	Single corrugated metal pipe
Tributary 1 – 629 Ave Road Crossing	Concrete bridge
Tributary 2 – 629 Ave South Road Crossing	Metal frame bridge
Tributary 3 – 717 Road Crossing	Wooden bridge

Long Branch 21 Dam impounds Kirkman's Creek and creates the reservoir known as Kirkman's Cove Lake. The dam provides critical flood control benefits, specifically to the downstream town of Humboldt. The Lake is publicly owned property, and the phosphorus reductions achieved through this project will reduce the risk and frequency of harmful algal blooms (HABs), which require beach closures and reduce recreational trips to the lake, which has negative impacts on the local economy. Further, HABs and can be detrimental to public health and safety.

The potential value of cost-savings were not calculated from reduced threats to these infrastructure since a benefit to cost ratio cannot be calculated for intangible project benefits.

9. Improves water quality;

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

The NDEE 2020 IR lists Kirkman's Cove Lake on the 303(d) list of impaired waters for *E. coli,* nutrients (phosphorus and nitrogen), and sediment. The NNRD developed the Nemaha Basin Nonpoint Source Management Plan in 2019 (2019 NPSM Plan). The overall purposes of the plan are: 1) to provide a concise summary of water resource conditions in the planning area, 2) provide direction and a coordinated approach for addressing nonpoint source pollution, and, 3) to educate and involve the public and other watershed stakeholders on the importance of supporting conservation actions. The 2019 NPSM Plan identified Kirkman's Cove Lake as a focus Priority Area for the first five years of the Plan's implementation for water quality improvements. The 2023 Kirkman's Cove Lake Water Quality Management Plan (WQMP) was developed to provide a clear implementation plan to improve the water quality at Kirkman's Cove Lake. The WQMP identifies management practices to target pollutant sources to reach water quality standards. These practices include streambank and grade stabilization, an in-lake forebay, and dredging of the Lake.

Implementation of these streambank and grade control measures would provide stream stability benefits and would consequently reduce stream erosion and the influx of sediment and nutrients to downstream waterbodies. Additionally, the construction of the in-lake forebay will protect the water quality by detaining sediment that would otherwise enter the Lake. Dredging of the Lake will remove accumulated sediment and prevent resuspension and in-lake loading of pollutants. This will improve the lake for its currently impaired beneficial uses of

Aquatic Life Warmwater Class A, Primary Contact Recreation, and Aesthetics. It will also improve the other beneficial use of Agricultural Water Supply Class A.

The Project will benefit the entire watershed which has an area of 5,966 acres. The downstream town of Humboldt will also benefit from the water quality improvements within the watershed. Humboldt's population is approximately 800, according to the 2020 census. The NNRD estimates that between 4,000 and 5,000 individuals visit Kirkman's Cove Lake annually. These users will benefit directly from the improved water quality in the lake and improved water quality may result in increased recreational visitation.

Photo 1. Aerial photograph of sediment accumulated in the headwaters of the lake (2021)

The recommendations in the WQM Plan are anticipated to reduce sediment and phosphorus loads by 97% and 95%, respectively. The structural practices included in this Project account for 51% and 50% of the loads, respectively, and dredging will remove the accumulated sediment from the upper headwaters in the lake and reduce resuspension caused by wind and waves that creates turbidity. All WQM Plan recommendations together will benefit the lake by

reducing mean phosphorus concentrations from an average of 363 ug/L to 50 ug/l (SIA Table B-1.3). This would take the Lake from a hypereutrophic condition where algae is highly productive and reduce it down to meet state water quality standards.

Other possible solutions include a combination of non-structural alternatives such as policy, existing land use, or management practices that would reduce nutrients from entering the streams. Non-structural alternatives are included as recommendations in the WQM Plan and would be implemented on private land by landowners, and the structural alternatives have been included as part of this Project and funding request.

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

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

The NNRD has been an avid supporter of this Project and have participated in the planning efforts as the local governing jurisdiction. They have been an active participant in the planning process of the alternatives to date. The NNRD has taxing authority of 4.5 cents per $100 valuation based on local property taxes. They have included the cost of the Project in their upcoming annual fiscal budgets and long-range plans. Information and education efforts in the watershed are ongoing to encourage landowners to participate in the Environmental Quality Incentives Program (EQIP) cost-share program through NRCS in order to increase federal funds brought into the watershed.

Other funding sources for the Project include funds from Nebraska Department of Environment and Energy (NDEE) 319 program for practices recommended in the WQM Plan. Assistance through the P.L. 83-566 Watershed and Flood Prevention Operations (WFPO) program has been requested and will help support the stream stabilization and grade control components of the Project if funded.

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.

"Water Sustainability" means water use is sustainable when current use promotes healthy watersheds, improves water quality, and protects the ability of future generations to meet their needs. The local jurisdiction that manages and enforces water sustainability is the NNRD. The 2019 Nemaha River Basin Nonpoint Source Management Plan, the draft 2023 Kirkman's Cove Lake Water Quality Management Plan, and the 2022 Voluntary Integrated Management Plan are all plans that have been created and followed to support sustainable water use.

The goal of the 2022 IMP is to protect existing investments and interests while facilitating economic growth and well-being across the District. Goal 2 is to prevent or mitigate water-related conflicts within the District. This Project will help achieve Goal 2 by protecting water resources and improving water quality. It also helps achieve the overall goal of the IMP by enhancing the Lake's beneficial uses thus protecting investments and facilitating economic growth.

The 2019 NPSM Plan identified Kirkman's Cove Lake as a focus Priority Area for the first five years of the Plan's implementation for water quality improvements. The 2023 Kirkman's Cove Lake Water Quality Management Plan (WQMP) was developed to provide a clear implementation plan to improve the water quality at Kirkman's Cove Lake. The WQMP identifies management practices to target pollutant sources to reach water quality standards. These practices include streambank and grade stabilization, an in-lake forebay, and dredging of the Lake. These practices will reduce erosion, sediment influx to the Lake, and resuspension of accumulated sediments.

This Project supports sustainable water use by promoting healthy watersheds through providing grade control, streambank stabilization, protection of riparian corridors, improved water quality, and aquatic ecosystem restoration and rehabilitation. This supports the beneficial designated uses of aquatic life, recreation, and agricultural water use. The target area includes Kirkman's Cove Lake, which was identified as a high priority area. The usage of water within the watershed is predominantly agricultural for irrigation and livestock as well as recreation. This Project will provide benefits to the entire watershed, which is approximately 5,966-acres. The local public within the watershed and specifically in areas near the Project site will benefit most from this Project. The town of Humboldt, which is located approximately 2 miles downstream from Kirkman's Cove Lake and has a population of 800 according to the 2020 Census, will also benefit from the water quality improvements. Additionally, NNRD estimates that between 4,000 and 5,000 individuals visit Kirkman's Cove Lake

annually and these users will also benefit from the improved water quality in the lake. Stakeholders of this Project not only include the partners (NNRD), but also the agencies such as NGPC, USFWS, and the USACE permitting division.

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.

Water quality is a significant issue in the watershed, as identified by the Lake's listing in the 2020 Integrated Report. This Project will address these problems by providing site-specific methods to stabilize streams, capture sediment and phosphorus, and improve water quality and overall health of the Lake's ecosystem. Lakes like Kirkman's Cove provide value aquatic habitat and recreation, Nebraska's landscape lacks natural lakes, so the overwhelming majority of Nebraska's lakes are man-made reservoirs, which are particularly prone to sedimentation and eutrophication. Sediment deposition impairs aesthetics, habitat, water quality, and creates a maintenance burden for lake managers. Further, phosphorus loads to the lake and internal phosphorus recycling from accumulated sediment can lead to algal blooms and even harmful algal blooms (HABs), which can threaten the health of humans, pets, and wildlife that ingest potential microcystins found in water with HABs. These are important issues addressed by this Project, which are worthy of statewide funding and improvement efforts.

This Project will provide benefits to the entire watershed, which is approximately 5,966-acres in area, as well as the nearby town of Humboldt, NE. Humboldt has which has a population of 800 according to the 2020 Census. NNRD estimates that between 4,000 to 5,000 visitors come to Kirkman's Cove Recreation Area a year, which hosts a realm of outdoor and aquatic based activities. This includes tent camping, RV camping, boating and water skiing, fishing and a golf course within the park grounds. These activities are greatly hindered by poor water quality, and can reduce the number of visitors, specifically when there are HABs and the lake is closed. This Project, as documented here within, will help meet water quality improvement goals set forth in the TMDLs and state-wide efforts.

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.

This Project has submitted a request to apply for funding from the P.L. 83-566 Watershed and Flood Prevention Operations (WFPO) program (shown in the in the SIA Attachments) to provide funding assistance for the stream stabilization and grade control structure components of this project. It is anticipated that 100 percent of design costs and approximately 75 percent of total construction costs will be funded by the WFPO for this Project if funding is received. Additionally on the Federal level, the Environmental Protection Agency's approved WQM Plan enables 319 funding to be allocated to this Project. This will be administered locally by the Nebraska Department of Environmental Quality as applied for by the NNRD for water quality improvement practices. The WQM Plan identified land management conservation practices in the watershed as well as larger scale structural practices, which funds are being requested for in this WSF application. These components of the plan are eligible for 319 funds that are requested through Project Implementation Plan (PIP) applications. The WQM Plan must be updated every five years in order to remain eligible for 319 funds. Each request can be up to $300,000 at a time. There is no limit to the frequency of PIP applications, but the distribution of funds is limited to the amount of 319 funds Nebraska has available to allocate.

On the local level, NNRD is responsible for remaining costs and if other funding sources do not come through. The NNRD will assume future operation and maintenance costs. These partnerships at all levels saves the NRD money that will go towards additional structures that provide a safe watershed to Nebraskans. The best and worst-case cost-share costs are shown below and provided in the SIA in Table A-1.1(a) and A-1.1(b).

Worst-Case Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$4,386,800	$0	$320,000	$4,066,800	$2,440,080	$1,626,720
Engineering	$1,316,040	$0	$80,000	$1,236,040	$741,624	$494,416
Land Rights	$0	$0	$0	$0	$0	$0
Project Administration	$25,000	$0	$0	$25,000	$15,000	$10,000
Totals	**$5,727,840**	**$0**	**$400,000**	**$5,327,840**	**$3,196,704**	**$2,131,136**

Best-Case Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$4,386,800	$1,047,600	$1,280,000	$2,059,200	$1,235,520	$823,680
Engineering	$1,316,040	$419,040	$320,000	$577,000	$346,200	$230,800
Land Rights	$0	$0	$0	$0	$0	$0
Project Administration	$25,000	$0	$0	$25,000	$15,000	$10,000
Totals	**$5,727,840**	**$1,466,640**	**$1,600,000**	**$2,661,200**	**$1,596,720**	**$1,064,480**

14. Contributes to watershed health and function;

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

This Project is specifically targeted to improve the health and function of the Kirkman's Cove Lake and watershed. The benefits of this Project include significant improvements to the watershed health and function by providing grade control, bank stabilization, water quality improvement, and aquatic ecosystem restoration and rehabilitation. This Project will increase stream function within and upstream of the project areas. Specifically, there will be an overall increase in bed and bank stability and decreases in erosion that will increase aquatic functions from grade and bank stabilization structures. Aquatic species will benefit from the water quality improvements.

This Project will additionally improve water quality through stabilizing streams, which would reduce stream erosion and therefore, reduce the influx of sediment and associated nutrients to downstream waterbodies. The Project's in-lake forebay will also trap sediment that would otherwise enter downstream waterbodies and the Lake. Additionally, the dredging of the Lake will remove accumulated sediment and prevent resuspension. The 2023 WQM Plan identified these practices to improve water quality within the watershed. This Project will work in conjunction with water quality plans to improve water quality within the watershed. The water quality improvements will help contribute to reductions in the sediment, nutrient, and bacteria loads of Kirkman's Cove Lake. This will help meet the goals of the TMDL.

15. Uses objectives described in the annual report and plan of work for the state water planning and review process issued by the department.

- Identify the date of the Annual Report utilized.
- List any and all objectives of the Annual Report intended to be met by the project

- Explain how the project meets each objective.

The 2020 Annual Report (NDNR 2020), lists the goals as related to the Water Sustainability Fund;

Water Sustainability Fund

The Legislature created the Water Sustainability Fund in LB 906 (2014) and defined governance and appropriation in LB 1098 and LB 1098A. From July 2014 through June 2018, a net $46,170,000 has been transferred to the fund. Funds committed to projects through June 2018, are $41,702,715. Per LB 944, the appropriation for FY 2019 was reduced by $429,557 to $10,309,520. The transfer for FY 2019 is $6,000,000 per LB 945. According to *Neb. Rev. Stat.* § 2-1506, the goals of the Water Sustainability Fund are to:

- Provide financial assistance to programs, projects, or activities that increase aquifer recharge, reduce aquifer depletion, and increase streamflow;
- Remediate or mitigate threats to drinking water;
- Promote the goals and objectives of approved integrated management plans or groundwater management plans;
- Contribute to multiple water supply management goals including flood control, reducing threats to property damage, agricultural uses, municipal and industrial uses, recreational benefits, wildlife habitat, conservation, and preservation of water resources;
- Assist municipalities with the cost of constructing, upgrading, developing, and replacing sewer infrastructure facilities as part of a combined sewer overflow project;
- Provide increased water productivity and enhance water quality;
- Use the most cost-effective solutions available; and
- Comply with interstate compacts, decrees, other state contracts and agreements and federal law.

The objectives of the fourth, sixth, and seventh goals are met as follows. Costs were evaluated during the alternatives analysis to ensure that the most cost-effective solutions are being implemented.

Conservation and Preservation of Water Resources

Preservation of water resources is achieved by this Project through streambank stability and water quality improvements. The Project contains several structures that offer stream bank protection and grade control, which stabilize streams and protect and enhance the streams. This will reduce erosion and influx of sediment to downstream waterbodies. Water quality will also be improved by the sediment basins and in-lake forebay, which trap sediment that would otherwise enter downstream waterbodies. Dredging of the Lake will remove accumulated sediment and reduce in-lake nutrient loading. All of these measures will improve water quality and help conserve and preserve water resources.

Recreation

Kirkman's Cove Lake has great recreational value to the area as it is the largest lake within the Big Nemaha River Watershed. Recreational activities such as

boating and fishing will benefit from improved water quality in the Lake. High concentrations of phosphorus and nitrogen in the lake have resulted in excessive algae growth which degrade its recreational value. Reducing these nutrients as well as other sediment and contaminates will improve the Lake's useability for boating and other primary contact recreation. Dredging of the Lake also allows for safer boating. Improved water quality in the Lake will also improve aquatic life habitat therefore improving its value as a fishery.

Reducing threats to Property Damage
Stream degradation and widening are common throughout the watershed and can lead to loss of land, infrastructure damage, and interruptions to essential services. This Project would stabilize stream banks and crossing within the watershed to minimize degradation and erosion and protect from loss of land. Most land adjacent to streams is used for agriculture or ranching and landowners will benefit from protection of land used for crops and livestock. Stream crossings will be protected by grade stabilization at county road crossings.

Water Quality
This Project will improve water quality in Kirkman's Cove Lake and streams within the watershed by preventing erosion of streams which leads to sediment and nutrients entering waterbodies. The in-lake forebay address sediment and nutrients that are transported to the Lake by increasing retention time and inducing settlement of sediment and nutrients prior to reaching the main body of the Lake. Dredging of the Lake will remove sediment and nutrients that have already accumulated, thus reducing the amount of resuspension of sediments. This Project will improve water quality by reducing the amount of sediment and nutrients in the waterbodies. The 2023 Water Quality Management Plan identified these as priority practices to improve water quality within the watershed. This Project will work in conjunction with past water quality plans to improve water quality within the watershed.

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.

States are required to establish total maximum daily loads (TMDLs) for pollutants causing impairments in the waterbodies in accordance with the Section 303(d) of the federal Clean Water Act (CWA). The NNRD has a responsibility to meet the TMDL for Kirkman's Cove Lake. This Project helps to reduce sediment and phosphorus from agricultural areas by stabilizing streams and trapping sediment

reducing the influx of sediment and associated nutrients to downstream waterbodies. “Water Sustainability” is defined in Nebraska Title 264 as when water use is sustainable when current use promotes healthy watersheds, improves water quality, and protects the ability of future generations to meet their needs. This Project promotes healthy watersheds through stabilizing streams throughout the watershed and restoring and rehabilitating the aquatic ecosystem.

SUPPLEMENTAL INFORMATION ATTACHMENT

COVER LETTER

APPLICATION

SUPPLEMENTAL INFORMATION ATTACHMENT

BIBLIOGRAPHY

NEMAHA NRD

HOUSTON engineering, inc.

SECTION A

Section A includes Project cost and funding data for the Project. Costs were based on a design life of 20-years. The unit costs were determined by engineer estimates for project implementation and were based on local experience and engineering judgement. All estimated costs and benefits are subject to change due to local, regional, or world economics.

A-1 Project Cost and Funding Breakdown

Table A-1.1a – Worst-Case Project Cost and Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$ 4,386,800	$ -	$ 320,000	$ 4,066,800	$ 2,440,080	$ 1,626,720
Engineering	$ 1,316,040	$ -	$ 80,000	$ 1,236,040	$ 741,624	$ 494,416
Land Rights	$ -	$ -	$ -	$ -	$ -	-
Project Administration	$ 25,000	$ -	$ -	$ 25,000	$ 15,000	$ 10,000
Totals	**$ 5,727,840**	**$ -**	**$ 400,000**	**$ 5,327,840**	**$ 3,196,704**	**$ 2,131,136**

Table A-1.1b – Best-Case Project Cost and Funding Breakdown

	Total Costs	FEDERAL		Remaining Costs	STATE	LOCAL
		WFPO Cost-Share	NDEE Section 319		60% WSF Grant Request	Total Local Cost Share
Construction	$ 4,386,800	$ 1,047,600	$ 1,280,000	$ 2,059,200	$ 1,235,520	$ 823,680
Engineering	$ 1,316,040	$ 419,040	$ 320,000	$ 577,000	$ 346,200	$ 230,800
Land Rights	$ -	$ -	$ -	$ -	$ -	$ -
Project Administration	$ 25,000	$ -	$ -	$ 25,000	$ 15,000	$ 10,000
Totals	**$ 5,727,840**	**$ 1,466,640**	**$ 1,600,000**	**$ 2,661,200**	**$ 1,596,720**	**$ 1,064,480**

Table A-1.2a – Construction Costs Summary

Item	Quantity	Unit	Unit Cost	Total
Streambank Stabilization	1	miles	$316,800	$316,800
Grade Stabilization	9	ea	$120,000	$1,080,000
In-Lake Forebay	1	ea	$840,000	$840,000
Dredging	215000	CY	$10	$2,150,000
Total				**$4,386,800**

Table A-1.3 – Annual Cost Breakdown

Project Task	Year 1 (2024)	Year 2 (2025)	Year 3 (2026)	Remaining	Total Amount
Construction	$ -	$ 1,495,000	$ 1,495,000	$ 1,396,800	$ 4,386,800
Engineering	$ 598,000	$ 289,180	$ 289,180	$ 139,680	$ 1,316,040
Land Rights	$ -	$ -	$ -	$ -	$ -
Project Administration	$ 5,000	$ 7,500	$ 7,500	$ 5,000	$ 25,000
Total	**$ 603,000**	**$ 1,791,680**	**$ 1,791,680**	**$ 1,541,480**	**$ 5,727,840**

SECTION B-1

Section B relevant project information as referenced in the application. Section B includes a location map and proposed Project BMP locations for grade control and streambank stabilization, the in-lake forebay, and dredging. Information on loading, total phosphorus, and BMP removal efficiencies is also provided.

Figure B-1.1 – Project Area

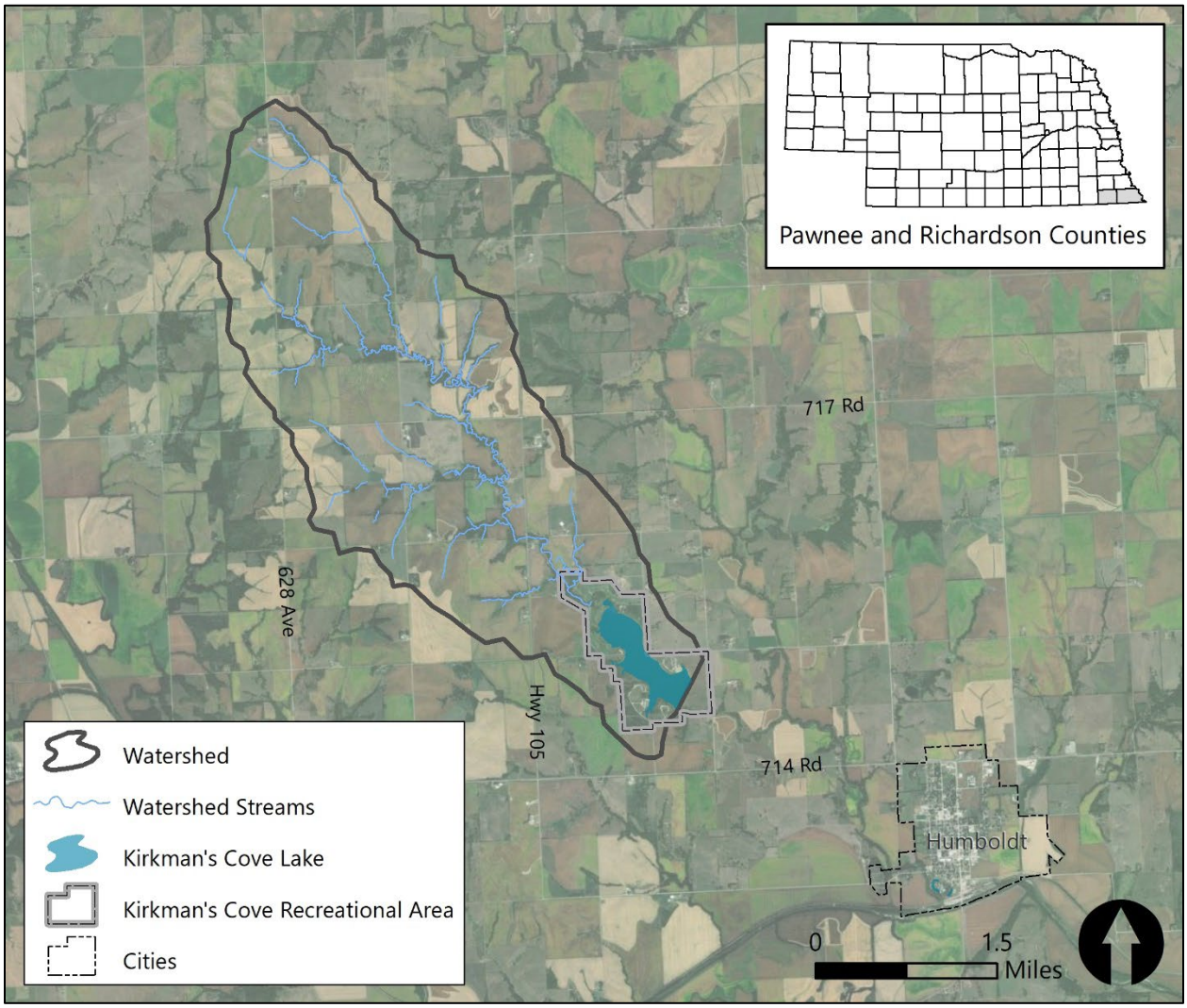

Figure B-1.2 – Proposed Grade Control Structure and Streambank Stabilization Locations

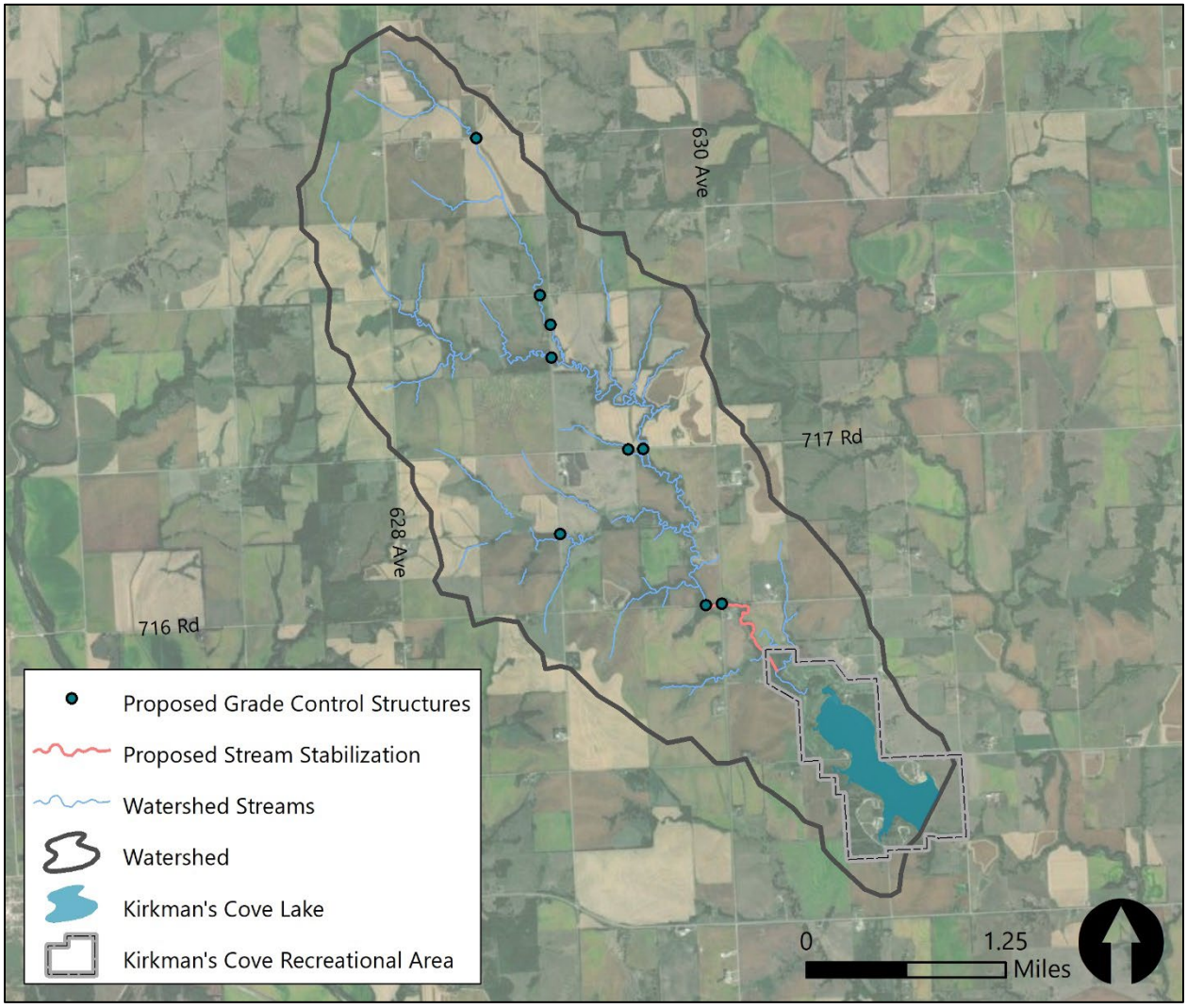

Figure B-1.3 – Proposed Forebay and Permanent Pool

Figure B-1.3 – Proposed Dredging Extents

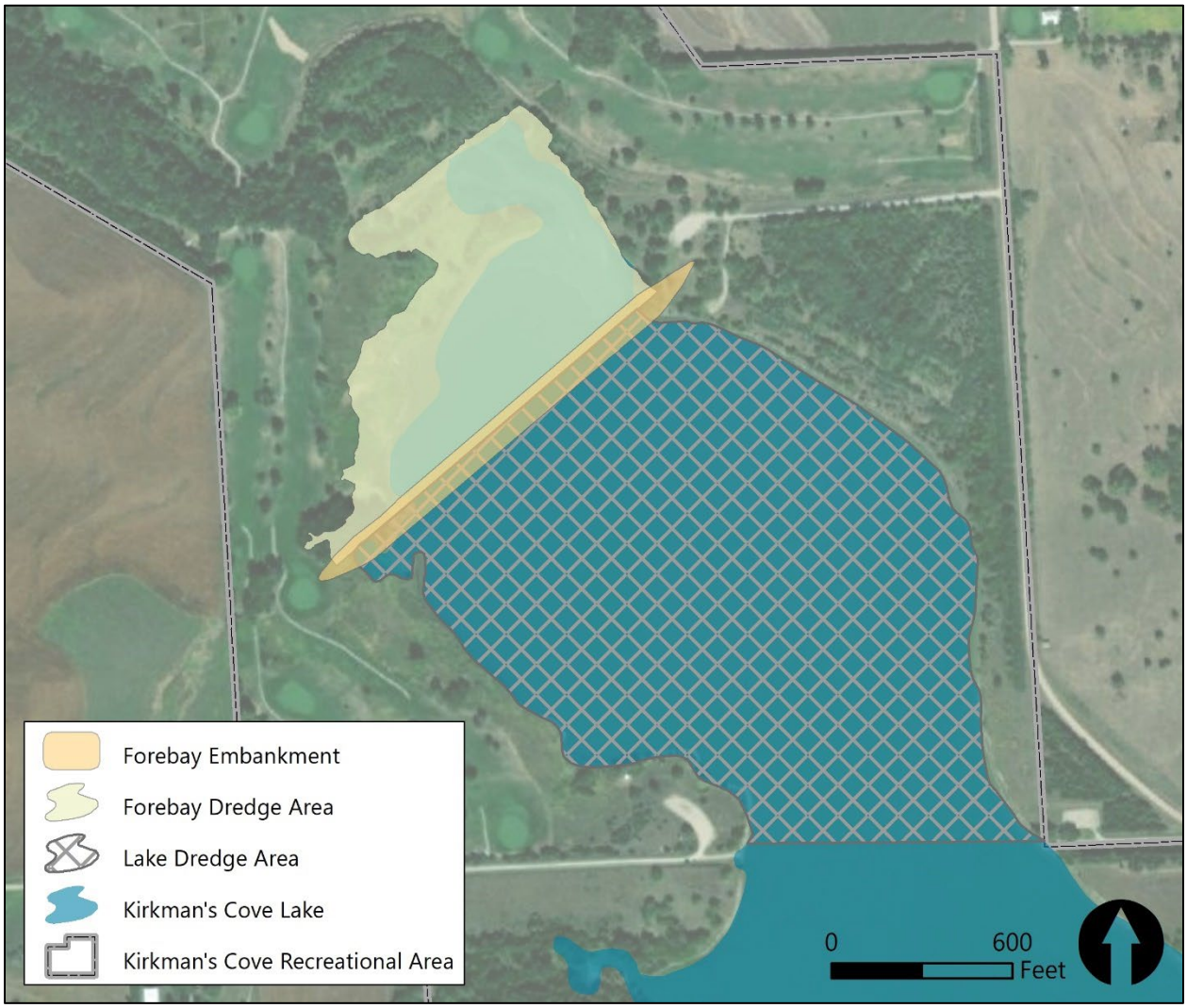

Table B-1.1 – Total Phosphorus (TP) Loads by Source

Source	Descriptions	TP Load (lb/yr)	Percent (%)
Pastureland	Grazed and ungrazed grasslands	715	6%
Row Crops	Sheet and rill erosion from corn and soybeans dominated agriculture	4,092	36%
Forest	Forested areas surrounding lake and streams	149	1%
Urban	Urban areas, roads, and farmsteads	177	2%
Streambank	Streambank erosion into channel	2,573	23%
Septic	Runoff from individual rural systems	3	0%
Internal	Natural causes in the lake	3,609	32%
Total		**11,322**	**100%**

Table B-1.2 – BMP Removal Efficiencies

BMP	Removal Efficiency (%)	
	Sediment	Phosphorus
Bank Stabilization	90%	80%
Grade Stabilization	90%	80%
In-Lake Forebay	20%	20%
Dredging	N/A	80%

Table B-1.3 – Total Phosphorus Summary

Parameter	Existing Conditions	Goal	Required Reduction	% Reduction
Phosphorus Concentration (µg/L)	363	50	313	86%
Total Annual Load (lbs)	11,322	569	10,753	95%

BIBLIOGRAPHY

NEMAHA NRD

HOUSTON engineering, inc.

BIBLIOGRAPHY

HDR. 2015. *Environmental Review Technical Memorandum – Kirkman's Cove Sediment Control.*

Referenced in Application:
Section B-1.A.3

Nebraska Association of Resources District. 2018. *Kirkman's Cove Recreation Area - Nemaha Natural Resources District.*

Referenced in Application:
Section B-3.B, C-6, C-9, C-11, C-12

Nemaha Natural Resources District, 2019. *Nemaha Basin Nonpoint Source Management Plan (2019 NPSM Plan).*

Referenced in Application:
Section A-6, B-3.B, C-6, C-9, C-11

Nemaha Natural Resources District. 2020. *Rules and Regulations for Groundwater Quantity Management Areas.*

Referenced in Application:
Section C-1, C-3

Nemaha Natural Resources District. 2021. *10-Year Master Plan 2021-2030.*

Referenced in Application:
Section C-6, C-9, C-10, C-12, C-15

Nemaha Natural Resources District. 2022. *Long Range Plan.*

Referenced in Application:
Section B-8, C-9, C-10

Nemaha Natural Resources District. 2022. *WFPO Preliminary Investigation Feasibility Report (PIFR) Request Letter.*

Referenced in Application:
Section A-6, C-10, C-13

Nemaha Natural Resources District. 2023. *Kirkman's Cove Lake Water Quality Management Plan (WQM Plan).*

Referenced in Application:
Section A-5, B-1.A.2, B-2, B-3.B, C-1, C-4, C-6, C-9, C-11, C-14, C-15

Nebraska Department of Environmental Quality, Water Quality Division. 2002. *Total Maximum Daily Loads for Kirkman's Cove Lake – Richardson County, Nebraska.*
Referenced in Application:
Section C-7, C-12, C-16

Nebraska Department of Environment and Energy, Water Quality Division. 2020. *Water Quality Integrated Report.*
Referenced in Application:
Section A-6, C-1, C-5, C-7, C-9, C-12, C-16

Nebraska Department of Natural Resources (NDNR). 2018. Title 264 – *Rules Governing the Administration of the Water Sustainability Fund*.

Nebraska Department of Natural Resources (NDNR). 2020. *Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process.*
Referenced in Application:
Section B-9, C-15

Nebraska Department of Natural Resources (NDNR), Nemaha Natural Resources District (NNRD). 2022. *Voluntary Integrated Management Plan.*
Referenced in Application:
Section C-2, C-11

United States Department of Agriculture (USDA). *Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resources Investments, DM 9500-013.*
Referenced in Application:
Section B-3