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July 24, 2018

Mr. Jeff Fassett, P.E.

Director, Nebraska Department of Natural Resources

via Electronic Submission

Re: Lower Loup NRD Application for Water Sustainability Fund Grant

The Lower Loup Natural Resources District (LLNRD) submits the included application to the Water Sustainability Fund for the development of District Drought Management Plan. The Board of Directors of the Lower Loup NRD recognizes the importance of detailed drought study information and the development of mitigation activities for conservation and protection of the water resources. These types of plans are necessary to guide the Board towards science-based, management decisions utilizing the best available data. The LLNRD Board has approved this application to the Water sustainability Fund and committed to providing the necessary matching funds to the grant.

The LLNRD hopes that the Natural Resources Commission shares the Board of Directors recognition of the importance of drought study and planning in order to conserve and protect the water resources of the state. The LLNRD has and will continue to work with the partner agencies, including other Natural Resource Districts, the University of Nebraska Conservation and Survey Division, NDNR and other state, city, and county agencies to protect our groundwater resources for the continued beneficial use of the citizens of Nebraska. Should the Department or the Natural Resource Commission require any additional information or clarification regarding this application, please contact me directly and I will ensure that your request is met. Thank you for your consideration of this grant application.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Russell Callan', is written over a light blue horizontal line.

Russell Callan
General Manager

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Lower Loup Natural Resources District Drought Management Plan

PRIMARY CONTACT INFORMATION

Entity Name: Lower Loup Natural Resources District

Contact Name: Tylr Naprstek

Address: 2620 Airport Drive, Ord, NE

Phone: 308-728-3221

Email: tnaprstek@lnrd.org

Partners / Co-sponsors, if any: [Click here to enter text.](#)

1. Dollar amounts requested: (Grant)

Grant amount requested. \$ 52,260

Loan amount requested. \$ N/A

If Loan, how many years repayment period? N/A

If Loan, supply a complete year-by-year repayment schedule.
N/A

Are you requesting less than 60% cost share from the fund?

No

If so what % ? N/A

2. Permits Needed - Attach copy for each obtained (N/A = not applicable)

Nebraska Game & Parks Commission
(G&P) consultation on Threatened and
Endangered Species and their Habitat

N/A Obtained: YES NO

Surface Water Right

N/A Obtained: YES NO

USACE (e.g., 404 Permit)

N/A Obtained: YES NO

Cultural Resources Evaluation

N/A Obtained: YES NO

Other (provide explanation below)

N/A Obtained: YES NO

3. Are you applying for funding for a combined sewer over-flow 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

If yes attach a copy to your application. N/A

If yes what is the population served by your project? N/A

If yes provide a demonstration of need. N/A

If yes and you were approved for funding in the most recent funding cycle, then
resubmit the above information updated annually but you need not complete the
remainder of the application.

**4. If you are or are representing an NRD, do you have an Integrated
Management Plan in place, or have you initiated one?**

N/A YES NO

**5. Has this application previously been submitted for funding assistance from
the Water Sustainability Fund and not been funded?**

YES NO

If yes, have any changes been made to the application in comparison to the
previously submitted application? N/A

If yes, describe the changes that have been made since the last application.
N/A

No, I certify the application is a true and exact copy of the previously submitted and scored application. (Signature required)

Section B.

DNR DIRECTOR'S FINDINGS

Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?

YES NO

1(a). If yes (structural), submit a feasibility report (to comply with Title 261, CH 2) including engineering and technical data and the following information:

A discussion of the plan of development (004.01 A);
N/A

A description of all field investigations made to substantiate the feasibility report (004.01 B); N/A

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); N/A

A description of any necessary water and land rights and pertinent water supply and water quality information, if appropriate (004.01 D);
N/A

A discussion of each component of the final plan including, when applicable (004.01 E); N/A

Required geologic investigation (004.01 E 1); N/A

Required hydrologic data (004.01 E 2); N/A

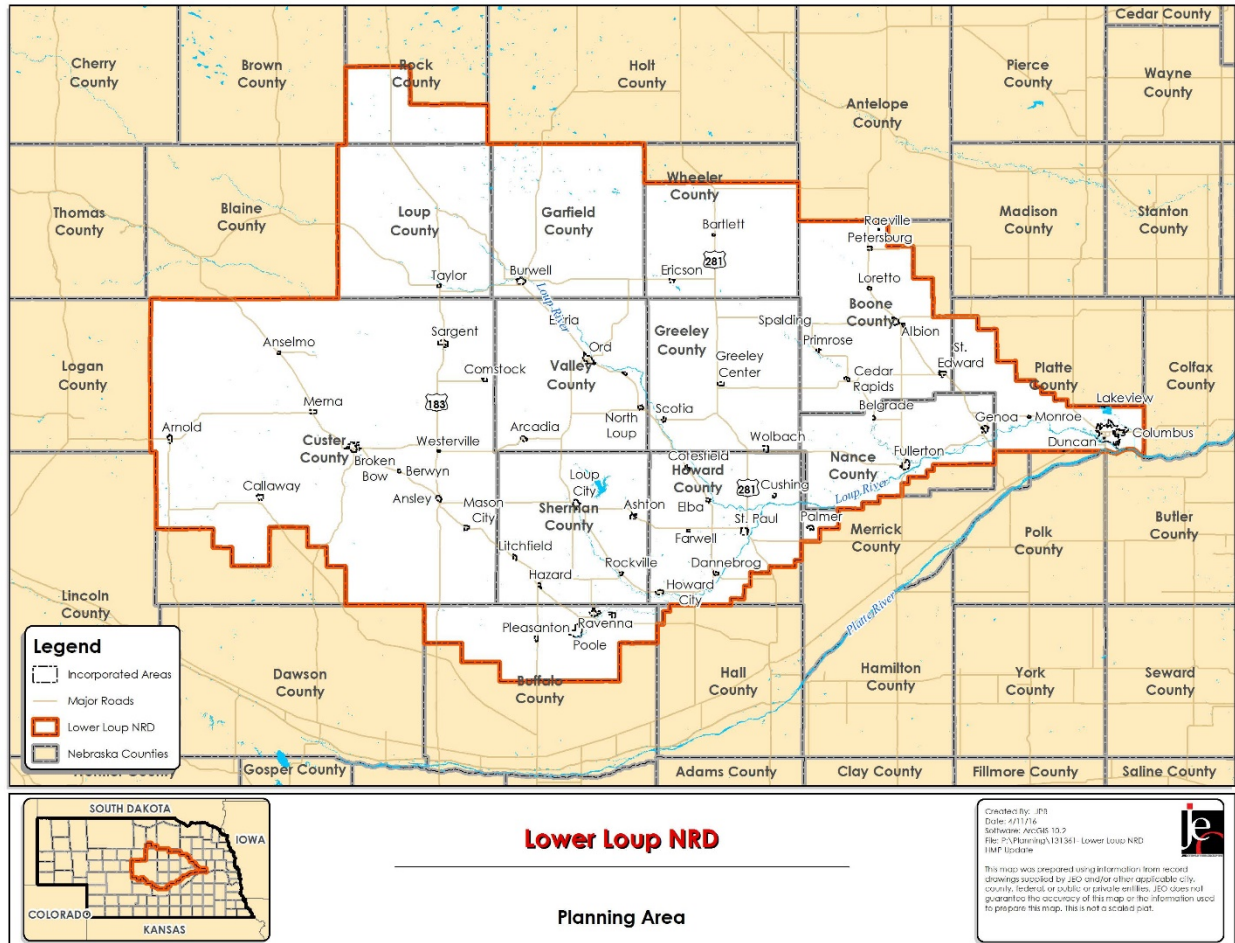
Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). N/A

1(b). If no (non-structural), submit data necessary to establish technical feasibility including, but not limited to the following (004.02):

A discussion of the plan of development (004.02 A);

The Lower Loup Natural Resources District (LLNRD) is pursuing an effort to develop a Drought Management Plan which will encompass the entire NRD district. LLNRD provides groundwater management for all or portions of 16 counties in central Nebraska. Throughout this planning process, an in-depth analysis of drought

vulnerabilities, current management practices, and mitigation actions will be collected and used when making future decisions. This plan will identify drought protocols and response measures that can be used by the NRD in future drought events. The overarching goal is to develop a management framework which will create more sustainable and effective water supply practices, thus benefiting both water quality and quantity throughout the region.



These proactive drought planning efforts will be guided by and consistent with the process outlined by the National Drought Mitigation Center (NDMC). The plan will incorporate the following components:

1. Project Management:

- JEO will develop a project management plan that includes: framework for project related communications, proposed project schedule, anticipated project milestones, and project deadlines.
- This task which JEO will complete includes but is not limited to: meetings and correspondence with local, state, and federal agencies as required; responding to stakeholder questions and request for information

- JEO will coordinate services provided by sub-consultants to ensure service delivery meets the project schedule and budget
 - JEO, HDR, and the LLNRD will attend a project kickoff meeting. JEO will develop meeting materials to include: meeting agenda, proposed project schedule
2. Data Collection:
- JEO will compile, assess, and summarize all available water resources data for the Lower Loup Basin and develop an inventory for available resources.
 - JEO will collect and review regional and state planning mechanisms related to drought and water resources management. These may include, but are not limited to: Master Plan, Long-Range Implementation Plan, Hazard Mitigation Plan, Voluntary Integrated Management Plan, Watershed Management Plan, and/or other local/municipal Water Emergency Contingency Plans.
 - JEO will collect and analyze records of past drought events, including severity, damages, and duration. Data sources may include: Palmer Drought Severity Index, Standard Precipitation Index, USGS stream gages, NRD well monitoring records, NCEI Severe Weather Database, and others.
3. Public and Stakeholder Engagement
- The LLNRD with assistance from JEO will host a drought tournament to engage stakeholders across the district from various sectors including: agriculture, industry, municipal, regulator, residents, etc. The tournament will evaluate current management protocols, identify gaps and vulnerabilities, and determine new or more beneficial practices. The tournament presents a hypothetical scenario based on past historical event and leads stakeholders through a multi-year response. The scenario is designed to foster relationships and partnerships across jurisdictions, stakeholders, and the LLNRD. Drought tournaments have been used across the country, while Nebraska is the first to apply them to regional watershed management.
 - JEO will lead the setup, facilitation, and documentation of project related meetings with stakeholders and the public.
 - JEO will coordinate with the LLNRD to construct a program to update the public on drought management activities.
 - LLNRD with assistance from JEO will develop press releases, social media prompts, flyers, and surveys necessary to engage the public.
4. Drought Management Plan
- JEO in coordination with the LLNRD will identify drought-specific vulnerabilities (vulnerable populations, critical management periods, past water shortages, etc.).
 - JEO and HDR in coordination with the LLNRD and the stakeholder/steering committee will identify potential best management practices that could be promoted and/or implemented within the district

that will reduce drought impacts, help proactively prepare for drought, and provide awareness during drought events.

- JEO will identify potential partners and funding opportunities the LLNRD and stakeholders can utilize to implement best management practices.

5. Recharge Projects

- HDR in coordination with JEO and the LLNRD will identify and analyze potential groundwater recharge areas and land management practices to augment water levels within the watershed basin.
- HDR will determine priority monitoring sites for the LLNRD to continue to conduct water quality and quantity assessment.

6. Develop Drought Monitoring Protocol

- LLNRD with assistance from JEO will develop a protocol for local drought monitoring and forecasting by using locally established drought thresholds through historical data and stakeholder input.
- JEO will provide the protocol and links to drought monitoring resources to the LLNRD for inclusion on their website.

A description of field or research investigations utilized to substantiate the project conception (004.02 B);

The National Drought Mitigation Center (NDMC) has conducted extensive research into best management practices and approaches to planning for future drought events. NDMC research, reports, and available data will be used in the development of the Drought Management Plan. Water management has been a priority for the LLNRD in the past, including developing a Voluntary Integrated Management Plan (IMP). However, this project will be different in that it focuses on water shortages across multiple sectors (agriculture, industry, municipal, residential, etc.) and develop response protocols based on the best local data available. Potential data sources that will be used during the planning process are listed in Table 1. The planning process will include the collection and examination of local and regional drought management plans to ensure the most appropriate drought management practices are used by the District.

Table 1: Likely Data Sources

Description of Data	Source(s)	Data Use
Ground water elevation	NRD, USGS	Develop drought triggers; analyze historic drought periods and ground water measurements.
Water use records	Municipal water suppliers	Identify use trends and opportunities for improved management.
Annual precipitation amounts	NOAA, Standard Precipitation Index (SPI)	Analysis of past and present precipitation trends.
Historic drought events	US Drought Monitor, Palmer Drought Severity Index (PDSI)	Used as part of the vulnerability assessment.

Historic loss data	USDA	Establish historic agricultural losses resulting from drought (and drought-related events).
Stream flow records	USGS	Examine stream flow trends to establish surface water monitoring protocols.
Population trends	US Census	Examine population trends and potential impacts on water usage.
Local/regional drought plans	TBD	Local/regional drought plans from across the United States will be collected and considered; specifically, local/regional drought plans will be examined for best management practices and local drought definitions.

A description of the necessary water and/or land rights, if applicable (004.02 C);

Water rights will be considered throughout the planning process. Examining water utilization and allocation during periods of reduced water supply make it critical to both define drought and identify the most appropriate management techniques. In addition, with water rights and downstream use being considerations for the NRD, it is important that those concerns be addressed during the planning process.

A discussion of 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).

This project will not include structural components. However, the development of the Drought Management Plan will assist in the protection of existing infrastructure from future losses by evaluating current vulnerabilities. The plan may also suggest additional water-related infrastructure projects to be pursued to build resiliency, as existing infrastructure can be damaged during periods of drawdown. A goal of this plan will be to identify critical management periods and establish a local drought monitoring and forecasting protocol. This plan will also focus on mitigating future damages, thus guarding against expensive repairs while prolonging the life of current infrastructure.

This project will include the identification of practical groundwater recharge areas and land management practices to augment water levels within the District, as well as the identification of priority monitoring sites for the District to continue to conduct water quality and quantity assessment. This analysis may lead to the envisioning of future groundwater recharge projects within the District.

- 2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative.**

Hazard mitigation planning is the most cost-effective method of building resilience to natural and man-made hazards. The National Institute of Building Science's 2017 report "Natural Hazard Mitigation Saves" (<https://www.fema.gov/media-library/assets/documents/156979>) study found that for every \$1 spent through hazard mitigation, entities save \$6 in potential future losses. Drought planning is increasingly becoming a priority for local and regional managers as water quantity and quality are top concerns for residents, water districts, and agricultural farmers throughout the state. Drought is a pervasive hazard that may span several years and grow in severity each season, impacting every community differently. Developing a Drought Management Plan at the NRD level provides a cohesive plan throughout the region. The plan may also mitigate potential costs for individual communities throughout the district who may attempt to develop solitary plans, but identify conflicting goals, actions, and protocols. Additionally, a regional plan encompasses all stakeholders within the region, including agricultural water users who may be outside of community boundaries but are profoundly affected by drought management practices.

Conversely, the NRD could choose not to develop a Drought Management Plan. While this is the first plan to be developed for this region and the NRD could maintain the status quo, the development of this plan will help identify specific vulnerabilities for the region. Addressing vulnerabilities by defining drought locally and developing action protocols will aid in reducing future economic and environmental losses. Districts that pursue Drought Management Plans also protect themselves legally by identifying necessary actions prior to high-stress events when crisis-driven decisions can lead to ill-informed or rushed management practices.

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 shall be fifty (50) years or with prior approval of the Director, up to one hundred (100) years [T261 CH 2 (005)].

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

The total project cost is \$87,100. The costs cover project work that will be completed between FY18 and FY19. The budget includes payments to water resources and drought planning experts who will complete the scope of work outlined for this project. Specifically, the costs for the project cover the collection of data, development of the local definition for drought, the establishment of a response protocol, identification of

best management practices, the identification of specific mitigation alternatives that can be utilized, and the identification of practical groundwater recharge areas.

- 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 any intangible or secondary benefits 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, such that the economic feasibility of the project can be approved by the Director and the Commission (005.02).

The LLNRD is dedicated to protecting and maintaining natural resources throughout the district, including water quality and quantity. This Drought Management Plan project will significantly aid the district in accomplishing these goals by benefiting multiple sectors (see Table 2). While establishing monetary values to the range of benefits this plan may provide is difficult, the findings and practices adopted through the process will produce significant savings. These may include protecting existing infrastructure for municipal water systems, increasing water supply security for all users, improving water quality and quantity for recreational purposes, and native wildlife and environmental protection.

Table 2: Project Benefits

Benefit Category	Benefit	Description
Water Quality	Recreation, Wildfire, Threatened/Endangered Species	Guarding against low-flows during periods of drought protects water quality and decreases the potential for municipal/private well interference and contamination.
Agriculture	Security of Water Supply	Identifying and planning for critical management periods protects agricultural production.
Environmental	Wildlife and Threatened/Endangered Species	Environmental systems benefit from flow protections; native species can prosper and thrive given proper management practices.
Societal	Security of Water Supply	Developing the Drought Management Plan will protect both municipal and agricultural water use, an often-challenging task, allowing for both interests to be safeguarded without blame; stabilizing industry and agricultural production should result in population stabilization in rural areas.
Achievement of local/regional objectives	Master Plan, Integrated Management Plan (IMP), Hazard Mitigation Plan (HMP)	Managing water resources is a primary focus for NRD planning; the Drought Management Plan will provide a robust foundation for future decisions and management tools employed by the NRD.

- All benefit and cost data shall be presented in a table form to indicate the annual cash flow for the life of the proposal, not to exceed 100 years (005.03).

As stated previously, monetary evaluation of tangible benefits is difficult to quantify for a Drought Management Plan. However, due to historic losses reported in the Lower Loup NRD Hazard Mitigation Plan (2017) drought and drought-related impacts has caused an estimated \$33 million in property damages and over \$209 million in crop losses for the planning area since 2000. The development of the Drought Management Plan will assist the district in detecting drought sooner, implementing best management practices, and creating a more resilient response to drought, thus reducing potential future losses from drought. The University of Nebraska-Lincoln’s report “Understanding and Assessing Climate Change: Implications of Nebraska” (<http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>) predicts a rising trend in both frequency and intensity of droughts and states, “developing a plan to mitigate these events and reduce potential losses is critical.”

- 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, the economic feasibility of such proposal shall be demonstrated by such method as the Director and the Commission deem appropriate (005.04).

4. Provide evidence that sufficient funds are available to complete the proposal.

Appendix A is the LLNRD’s letter of financial commitment to the project. The LLNRD’s budget for July 1, 2017 to June 30, 2018 was \$12,914,485.00 with a property tax levy of 0.030083 resulting in approximately \$4,997,283.13 of local property taxes. Property tax accommodates approximately 38.6% of the total LLNRD budget.

- 5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace).**
N/A
- 6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.**
N/A
- 7. Describe how the plan of development minimizes impacts on the natural environment.**

Due to the resilient nature of this project, the plan of development is likely to provide positive environmental benefits. The Drought Management Plan will emphasize awareness of drought vulnerabilities, protocols, responses, and decisions made prior to, during, and after drought events. By completing the plan and identifying these factors, improvements in water quality, quantity, and stream flows will produce a wide variety of environmental benefits in the planning area. If the plan of development is successful, the result of drought planning is more sustainable flows during periods of drought. This will result in a more stable environment for the threatened and endangered species within the District. The LLNRD is home to a broad range of threatened and endangered species including the American Burying Beetle, Blowout Penstemon, Finescale Dace, Piping Plover, Interior Least Tern, Lake Sturgeon, Northern Long-eared Bat, Northern Redbelly Dace, Pallid Sturgeon, River Otter, Small White Lady's Slipper, Sturgeon Chub, Western Prairie Fringed Orchid, and Whooping Crane. All of these species are impacted on water management practices utilized by the district and the communities within the planning area.

The planning process will also include the identification of potential mitigation actions to be undertaken in the future that will also provide additional benefits to the natural environment. These projects may include increased surface retention of stormwater runoff, implementing groundwater recharge projects, water conservation measures, etc. These benefits also extend to the social environment. By conducting the planning process in an open and engaging way, stakeholders from across the District will have an opportunity to better understand other sectors (agricultural, industrial, municipal) and to identify strategies and opportunities to work together to address social and environmental needs.

The recharge component of this project will also result in a number of environmental benefits. Benefits during drought include a better recharged aquifer for more sustained water resources. In addition, potential recharge sites can also help during other events, such as precipitation events with high levels of runoff. Onsite detention in the form of recharge sites can help reduce peak flows during large precipitation events, reducing environmental degradations which currently occur. Current degradations include: surface runoff and erosion, streambank damages, and closure of some minor transportation routes.

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

The LLNRD has a wide range of statutory responsibilities and authorities, including, but not limited to, Nebraska Revised Statutes §2-3,201 through §2-3,243 and the Ground Water Management and Protection Act (Nebraska Rev. Statutes §46-701 through §46-756). Specifically, Nebraska Rev. Statutes §46-707(f) confer to the NRDs the power to “conduct investigations and cooperate or contract with ...public or private corporations, or any association or individual on any matter relevant to the administration of the [Ground Water Management and Protection] act.”

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

The development of this Drought Management Plan is consistent with, and complementary to, many local and regional plans and programs. The LLNRD voluntarily developed an Integrated Management Plan (IMP) in collaboration with the Nebraska Department of Natural Resources (NDNR). This plan identified goals, objectives, and action items to be taken by both agencies to build more sustainable practices in water supply management. The district’s Long-Range Implementation Plan (LRIP) lists water quality and water retention as its top two priorities. The goals in the LRIP are consistent with the IMP, including management of groundwater, surface water and water quality.

The Drought Management Plan is also consistent with the recently updated Lower Loup Natural Resources District Hazard Mitigation Plan (HMP). The regional HMP is a plan that examines risks and vulnerabilities at both the regional (NRD) and local level. The plan outlines strategies that can be utilized to reduce or eliminate future impacts from a range of natural and man-made hazards. During the hazard mitigation planning process, 58 jurisdictions across the District (counties, cities, villages, school districts, and irrigation districts) ranked nearly twenty natural and man-made hazards. Based on data collected from NOAA’s National Centers for Environmental Information and the USDA’s Risk Management Agency, drought was found to be the costliest hazard. Across the District, drought has resulted in approximately \$242 million in losses over the last 16 years (primarily agricultural). For this reason, drought was ranked a top concern for many of the plan participants across the District. Tables 3 through 7 examine applicable water management plans (Voluntary Integrated Management Plan, Long Range Implementation Plan, Hazard Mitigation Plan, and Master Plan), and identifies goals and objectives that consistently identify the need for improved drought planning and monitoring.

Table 3: Voluntary Integrated Management Plan Goals

Goal:	Objectives:
Promote and support a water supply and use inventory based on the best available data and analysis	<ul style="list-style-type: none"> • Develop and maintain a comprehensive inventory of the location and source of the District’s current and future water supplies, water uses, and outflow. • Monitor current and future water demands in the basin. • Use best available science and technology to monitor water supplies. • Utilize existing policies and authorities of the District and the Department to address water quantity issues.
Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands	<ul style="list-style-type: none"> • Collaborate with state and local governments to identify opportunities to augment water supplies within the District and, if necessary, identify opportunities to supplement with imported water from outside the District. • Monitor the instream flow needs in the Lower Platte Basin to foster an understanding of any existing appropriation

	<p>priorities and locations, and provide a basis for evaluating impacts of existing and future uses.</p> <ul style="list-style-type: none"> • Evaluate options for water banking methodologies.
Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development	<ul style="list-style-type: none"> • Identify available water storage opportunities throughout the District. • Evaluate, understand, and develop policies to address impacts on stream flows resulting from uses outside of management control.
Continue public education programs that encourage water conservation measures	<ul style="list-style-type: none"> • Investigate and promote water use efficiency. • Continue public education and cost share programs to encourage conservation and best management practices.

Table 4: Long Range Implementation Plan Priorities

Priority Level	Description
1	Water Quality
2	Water Retention (surface water/storage/recharge/dams)
3	Protection of basin resources
	Buffer strips/streambank stabilization and maintenance/wetland management
4	Forestry – rural and urban/tree planting/shelter belts
5	New irrigated acres development
6	Public promotion/awareness/education in schools & clubs
7	Range Management
8	Wellhead protection
9	Soil conservation/system approach to no-till/cover crops
10	Habitat development/recreation/pivot corners/native plant restoration/species diversification for landscaping
11	Control of invasive weeds on rivers/streams
12	Project participation policies/process
13	Interaction with irrigation districts and municipalities
14	Parks/arboretum/recreational areas/trails/assistance
15	Cost-share practices/incentives (development) vs. penalties (efficiency)
16	Hunting/fishing/acres & access/habitat/wildlife/game birds
17	Sandhills wetland management and conservation
18	New land development
19	Ecotourism
	Additional funding for planned grazing systems
	Flood control/protection of municipalities/prioritize concern/problem areas flooding/damage
20	Role of land use in watersheds

Table 5: Long Range Implementation Plan Goals

Focus Area	Goal
Resource Awareness	Resource Awareness
Flood Protection	Prevent damage from flood water
Water Quantity	Development and management of groundwater and surface water for beneficial uses

Trees	Forestry management
Water Quality	Water quality and pollution control
Soil Erosion	Erosion prevention, control and sediment reduction
Range	Range management
Drainage Improvement	Drainage improvement and channel rectification
Fish and Wildlife	Development and management of fish and wildlife habitat
Habitat/Recreation	Development and management of recreational and park facilities

Table 6: Hazard Mitigation Plan Goals

Goal	Objective
Protect Public Health and Safety from Hazard Events	Groundwater Recharge
Protect Existing and New Properties from Hazard Events	Develop Drought Management Plan
Increase Public Awareness and Education about Hazard Events	Reduce Water Demand/Improve Drought Education
	Emergency Exercise: Drought Tournament
	Monitor Drought Conditions
	Monitor Water Supply
	Water System Improvements

Table 7: Master Plan 2012-2022 Goals and Objectives

Goal:	Objective:
Water Quality and Pollution Control	Provide local administration of the water quality sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.
	Provide local administration of the Nebraska chemigation Act Sections 46-1101 through 46-1148RRS, Nebraska 1943.
	Maintain and expand when necessary the District's water quality monitoring program to enhance the water quality database.
	Cooperate with cities and villages on public drinking water systems through the wellhead protection program utilizing watershed planning and promotion of wellhead protection zoning.
	Provide technical and financial support to individuals and government entities on water quality concerns and pollution prevention.
	Continue to support and assist private individuals on livestock pollution prevention and control systems.
	Develop and maintain educational programs to assist agricultural producers and urban homeowners on the use of pesticides and other environmentally sensitive chemicals.
Development and management of groundwater and surface water for beneficial uses	Provide local administration of the water quantity sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.
	Through basin-wide water management provide the framework necessary to protect and utilize the water supply for beneficial use by agriculture, municipalities, domestic and industrial users.
	Continue the present program for well monitoring.
	Track the interconnection of groundwater and surface water and manage the resource for conjunctive use in watershed planning.

	Encourage metering of irrigation withdrawals and provide leadership on programs to reduce over application of irrigation water.
	Monitor annual basin DNR reviews for fully appropriated status under LB952 and manage water resources to avoid such designation.
	Address integrated water management in the Loup River Basin.
	Continue work on Elkhorn Loup Modeling (ELM) Project and maintain data collection efforts.
	Continue flow meter cost-share program and utilize data to determine groundwater use in the basin.
	Encourage the efficient use of irrigation water through construction of reuse systems and use of water saving technology.
	Promote utilization of crop water use information.
	Provide local administration of the Ground Water Management and Protection Act found in State Statute 46-701 through 46-754 RSS, Nebraska 1943.
	Provide local administration and leadership on programs and policies regarding the administration of instream appropriations found in Sections 46-2,107 through 46-2,119 RRS, Nebraska 1943.
	Continue to promote a systematic program of maintenance on irrigation power units and adjustment of pumps to conserve energy and reduce pumping costs.
	Cooperate with irrigation districts on protection and development of groundwater and surface water.
	Act as local voice on transbasin divergence of surface waters to ensure that basin surface water needs are protected.
	Cooperate with local, state, and federal agencies on water supply programs and problems.
	Carry on comprehensive education programs on groundwater and surface water management.
Resource Awareness	Maintain a state of awareness on conservation, pollution, development, and all subjects relative to the mission and function of Natural Resources Districts.
	Continue to provide vigorous public information and education programs about natural resources conservation and the conservation programs offered through the NRD.
	Develop a close working relationship between NRD, news media, and the general public.
	Maintain an adequate system for in-house dissemination of information between directors and staff.
	Develop a system for director and staff attendance at meetings pertaining to resource development.
	Schedule tours for directors, staff, news media, and agency representatives within specific areas to develop awareness of problems within the District.
	Maintain close coordination with federal, state, and local agencies on problems and new techniques for resources development.
	Maintain and update the Hazard Mitigation Plan developed for communities, counties, and other governmental subdivisions in the District.
	Continue to pursue outside funding sources such as the Environmental Trust, 319, Resource Development Fund, and other sources for natural resources conservation.
	Provide adequate resources to fully implement the goals and objectives of this Master Plan.

Prevent Damage from flood waters	Through watershed planning and management, provide assistance with programs and projects to assist municipal and rural residences with flood control measures.
	Provide local, state, and federal governments with information on flooding potential and respond to needs when flooding occurs.
	Provide assistance to individuals as well as state and federal entities on floodplain zoning programs.
	Provide educational material on the threat of flooding and prevention of damage through zoning.
	Develop a program to construct storage reservoirs.
Forestry Management	Continue the District's program for establishment of farmstead, livestock, and field windbreaks.
	Maintain high standards for the District tree planting program to ensure survival.
	Continue to provide new and modern equipment to complement the established program.
	Cooperate with federal and state agencies to develop forestry plantings for timber production.
	Develop a comprehensive public information and educational program for forestry practices.
	Continue the cooperative agreement with the Nebraska Forest Service (NSF) on the staff forester position.
Erosion prevention, control and sediment reduction	To develop a complete and comprehensive program for erosion control on crop land, stream banks, and range land from both water and wind, controlling sedimentation at the source being the most economical means for control and reduction.
	To carry on a continuing program of technical and financial assistance to farmers and ranchers for the application of basic soil and water conservation practices to be implemented in the following manner: <ul style="list-style-type: none"> • Continue the basic memorandum of understanding with the United States Department of Agriculture (USDA); • Continue the supplemental memorandum of understanding with the Natural Resources Conservation Service (NRCS8051S) to control erosion and sedimentation on agricultural land; • Work closely with the Farm Service Agency (FSA), Congress, and the State of Nebraska to maintain conservation cost-share assistance programs and strive to increase those funds both nationally and in Nebraska; and, • Provide local tax funds when available and practical to supplement Federal and State funded cost-share programs
	Provide the local leadership to administer the Erosion and Sediment Control Act as found in State Statues 2-4601 through 2-4613, RRS, Nebraska 1943.
	Continue the program of assistance to counties and other governmental agencies for construction of flood control road structures on public highways until such time that the NRD feels that it has adequately demonstrated the economical benefit of such a program. The program to be implemented as follows: <ul style="list-style-type: none"> • Provide assistance in a manner prescribed by the Board;

	<ul style="list-style-type: none"> Request survey and design by the Natural Resources Conservation Service; Strive to implement other programs district-wide; and, Provide engineering assistance from sources other than NRCS, when necessary
	Provide assistance to cities and villages for urban subdivision development erosion problems.
	Continue to support the soil survey program: <ul style="list-style-type: none"> Seek assistance from the NRCS to maintain the most up-to-date scientific soil survey data; and, Make available and disseminate completed and published information
	Provide assistance to individuals and governmental entities on streambank erosion.
Range Management	Continue to provide technical assistance on range management practices: <ul style="list-style-type: none"> Provide, through special initiations and grant programs, additional range management field staff to work with constituents.
	Continue to promote the conversion of crop land to grass on those land classifications that are less suitable for farming.
	Provide services for seeding when not available from private enterprise.
	Continue to promote planned grazing systems in cooperation with federal and state agencies.
	Continue to promote control of native and non-native invasive species through mechanical/chemical means, and/or controlled burns.
	Employ range specialist on the District level as the need develops.
Drainage improvement and channel rectification	Utilize the special projects sections of the NRD Law to assist local communities on drainage and channel rectification problems.
	Provide the necessary engineering and construction assistance to those communities with drainage and channel projects that will not have an adverse effect on the environment.
Development and management of fish and wildlife habitat	Provide adequate habitat for wildlife, including food, water, and shelter.
	Create wildlife buffers between urban and rural landscapes.
	Promote and provide assistance for the preservation, protection, and enhancement of wildlife habitat.
	Continue to provide funding for approved wildlife habitat programs.
	Continue to develop and provide public access for hunting, fishing, and outdoor activities.
	Develop the Davis Creek and Pibel Lake fisheries.
	Provide for and protect threatened and endangered species in the District.
	Provide fishery habitat, waterfowl habitat, and upland game bird habitat on District construction projects, whenever possible.
	Carry on a continuing educational program to emphasize the need to protect all types of habitat.
Development and management of recreational	Provide recreational facilities on district projects when opportunities are presented.
	Provide recreational trails when opportunities are presented.
	Consider NRD sponsorship of recreational development in conjunction with federal and state projects.

and park facilities	Provide for construction of multi-benefit projects, where recreation is combined with water storage, groundwater recharge, stream augmentation and other purposes.
	Provide financial and technical assistance to city and county government for park development.
	Continue to offer and expand recreational opportunities at Davis Creek Reservoir, Pibel Lake Recreation Area, and Headquarters Arboretum.
Solid waste recycling and disposal	Assist those responsible governmental agencies on establishment of sanitary landfills.
	Provide technical assistance on soils, water tables, and site selection.
	Provide technical assistance and engineering for on-site evaluation of erosion, sediment, flood control, and water quality monitoring.
	Provide information on solid waste issues and regulations to the public.
	Promote and provide technical and financial assistance to communities for recycling programs.

The Nebraska State Drought Plan (2000, <http://www.carc.nebraska.gov/docs/NebraskaDrought.pdf>) includes measures the district can undertake to address threats by drought. One such measure includes the responsibility of NRDs to develop a Drought Management Plan. Producing plans that work in cohesion provides a more stable framework for effective management practices across the region. Table 8 lists additional measures considered in the state plan which fall under the NRD's authority as identified by the Nebraska Agriculture, Natural Resources, and Wildlife Sub-Committee.

Table 8: Nebraska's Climate Assessment Response Committee (CARC) Drought Mitigation and Response Plan, 2000

Impact	Planned Actions	Assistance Agencies
Reduced range and pasture forage and livestock water results in poor animal health, soil erosion, and possible economic loss to ranchers	Encourage the use of range and pasture management techniques such as reduced stocking rates, reserve pastures, rotational grazing, removing competitive plants and stored feed to improve sustainability of rangelands under drought conditions.	National Grassland Association, Nebraska Cattlemen, UNL Extension, NRCS, NRDs, Sandhills Cattle Association
	Prior to and during drought, use public information programs and on-site visits to emphasize importance of rangeland management and planning to equalize stocking rates with available forage and the need for permanent water storage and distribution systems.	UNL Extension, NRDs, NEDA, DNR, NRCS, NDMC
	Monitor forage supplies and conditions around the state and facilitate information	UNL Extension, NRDs, NEMDA, NRCS, DNR, NDMC, FSA, Nebraska

Impact	Planned Actions	Assistance Agencies
	<p>exchange between interested parties. A) If conditions warrant, a meeting of a forage advisory committee will be organized early in the spring to determine hay stock availability, forage conditions, and wildlife concerns. B) Also, at that meeting, the procedure for emergency roadside haying through the Department of Roads could be discussed to determine need and value of this procedure. C) Also, at that meeting, it could be determined if a letter to the federal office of FSA is warranted to forewarn them of drought conditions and impending requests for CRP emergency release; this group would pass that recommendation on to CARC, who would then pass the request for the letter on to the Governor and the Director of Agriculture.</p>	<p>Cattlemen, Farm Bureau, Alfalfa Association, Nebraska Department of Roads</p>
	<p>Assist ranchers in obtaining supplemental income by connecting them with employment opportunities, and during drought, by holding job fairs and raising general awareness of job opportunities and ranchers' work skills.</p>	<p>Nebraska Department of Labor, NEDA, UNL Extension, NRDs, Center for Rural Development</p>
	<p>Establish and activate a statewide and nationwide hotline system for locating economical feedstock sources.</p>	<p>NEDA, UNL Extension, Nebraska Cattlemen, National Guard, Farm Bureau, NEMA, NRDs, NRCS, Alfalfa Association</p>
<p>Reduced soil moisture on dry cropland poses economic loss to farmers and possible increased soil erosion and blowing dust</p>	<p>Use public information programs to emphasize installation of soil and water conservation systems (i.e., terraces, crop residue use, and contour planting).</p>	<p>NRCS, SSARE, DEQ, UNL Extension, NRDs</p>
	<p>Emphasize additional measures regarding crop residue management,</p>	<p>NRCS, SARE, DEQ, UNL Extension, NRDs</p>

Impact	Planned Actions	Assistance Agencies
	grassing terraces and emergency tillage to control soil blowing.	
	Investigate use of rainfall enhancement projects in targeted areas.	NEDA, DNR, NRDs
Decreased irrigation water from surface water sources prevents achievement of crop harvest potential	Emphasize adjustment of irrigated acre age to meet expected water availability.	DNR, NRDs, NRCS, Irrigation Districts, UNL Extension, USBR
	Develop a funded loan program to encourage installation of on-farm water conservation measures.	USBR, DNR, DEQ, NRDs
Increased irrigation pumping from underground water sources may lower water levels and decrease pumping rates resulting in less capacity to meet crop needs and decreasing the profitability of an irrigated cropping system	Continue to emphasize irrigation water management techniques and develop emergency loan program to promote installation of on-farm water conservation measures.	NRDs, USBR, DEQ, NRCS, UNL Extension, FSA, NEDA
	Maintain water-level measurement program to monitor declining aquifer levels.	NRDs, UNL CSD
	Maintain groundwater metering efforts and establish an emergency allocation program.	NRDs
Loss of farmers and ranchers due to drought-induced bankruptcy	Encourage continuation of federal emergency indemnity plans for crop and livestock agriculture.	NEDA, FSA, NRDs
Increased health problems for residents of areas experiencing problems from blowing dust (Also included within the Municipal Water Supply, Health, and Energy Subcommittee plan)	Communicate with state medical allergy and asthma experts to develop recommendations.	UNMC, UNL Extension, NRDs, NRCS, local health offices, environmental health fund, NEMA, HHS
	Establish education programs to increase awareness of dust-related respiratory problems and how proper land management can improve air quality.	
	Develop funded initiatives to explore mitigation of health effects.	
Due to drought, many public water supply systems experience potable water demand problems	Emphasize, and evaluate, long and short-term drought contingency plans for all systems.	NHHS, League of Municipalities, NRDs, Nebraska Rural Water

Impact	Planned Actions	Assistance Agencies
	<p>Emphasize indoor and outdoor water conservation measures.</p> <p>Maintain list of “problem systems”, with history or potential for drought-related problems.</p> <p>Develop programs and educate the public on the potential uses of wastewater.</p> <p>Develop partnerships with utility companies and others who can help distribute drought-related information.</p>	Association, NDEQ, AWWA, CED/UNL
Many rural water districts and small public water systems (under 10,000 population) develop operational (mechanical) problems when operating for extended periods of drought	<p>Maintain list of “problem systems” with history or potential for drought-related problems.</p> <p>Continue work with systems to develop a plan of long-term drought mitigation and short-term drought response actions.</p> <p>Maintain communication means and use NeRWA newsletter and training sessions to address drought-related issues.</p> <p>Explore, as needed, emergency funds.</p>	NRWD, NEMA, Nebraska Section of AWWA, Nebraska Department of Economic Development (NDED), USDA Rural Development, League of municipalities, NHHS, Midwest Assistance Program, NDEQ, UNL Extension, NRDs, Groundwater Foundation, Nebraska Department of Natural Resources, Nebraska Rural Water Association (NeRWA), EPA
Due to drought, private wells experience water quality and quantity problems	<p>Encourage NRDs to evaluate situation.</p> <p>Emphasize indoor and outdoor water conservation measures.</p>	NRDs, CSD/UNL, CED/UNL
Increased irrigation may overdraft available aquifer and affect municipal and rural water supplies during drought	<p>Promote groundwater-metering efforts and establish an emergency allocation program.</p> <p>Encourage statewide water level measurement program to effectively monitor aquifer levels.</p>	NRDs, Bureau of Reclamation, DOE, CSD/UNL, CED/UNL, USGS
Increased presence of large, industrial, independent water users may overdraft available aquifers during drought	<p>Maintain a list of large, industrial, independent water users.</p> <p>Enhance communication between large, independent water users and municipal suppliers to implement water</p>	NRDs, NDED, CSD/UNL, Nebraska Department of Natural Resources, League of Municipalities, CED/UNL

Impact	Planned Actions	Assistance Agencies
	conservation and drought-preparedness guidelines.	
Increased health problems for residents of areas experiencing blowing dust problems from drought affected agricultural lands	Communicate with state medical allergy and asthma experts to develop recommendations.	NHHS, UNMC, CED/UNL, NRDs, NRCS, Nebraska Emergency management Agency (NEMA), local health offices, environmental health fund
	Establish education programs to increase awareness of dust related respiratory problems and how soil and land conservation practices can improve air quality.	
	Develop funded initiatives to explore mitigation of health effects.	

10. Are land rights necessary to complete your project?

YES NO

If yes, provide a complete listing of all lands involved in the project.
N/A

If yes, attach proof of ownership for each easements, rights-of-way and fee title currently held.
N/A

If yes, provide assurance that you can hold or can acquire title to all lands not currently held.
N/A

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

The LLNRD has a wide range of statutory responsibilities and authorities, including, but not limited to, Nebraska Revised Statutes §2-3,201 through §2-3,243 and the Ground Water Management and Protection Act (Nebraska Rev. Statutes §46-701 through §46-756). Specifically, Nebraska Rev. Statutes §46-707(f) confer to the NRDs the power to “conduct investigations and cooperate or contract with ...public or private corporations, or any association or individual on any matter relevant to the administration of the [Ground Water Management and Protection] act.”

12. Identify the probable environmental and ecological consequences that may result as the result of the project.

The development of a Drought Management Plan is expected to produce only beneficial environmental and ecological impacts by allowing for better management of water quality and quantity. The plan will define local drought thresholds, establish monitoring protocols, identify specific actions to be undertaken throughout drought stages, and identify practical groundwater recharge areas. Overall, the plan will improve management of water resources to produce more sustainable water supplies throughout the district. These improvements will benefit water quality, river health, ecosystems, and a variety of threatened and endangered species including the Interior Least Tern, Piping Plover, Whooping Crane, River Otter, Lake Sturgeon, Pallid Sturgeon, and Sturgeon Chub.

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 in parenthesis. 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.

Water quality and quantity are of top concern during periods of drought. The development of a Drought Management Plan will address these threats by allowing the NRD to adequately identify and respond appropriate during low-flow or drought

scenarios. Local definitions of drought levels, specific actions identified by role, and integrated best management practices across multiple plans allow the NRD and stakeholders to make informed decisions and reduce overall risk during drought events. The National Drought Mitigation Center recommends developing drought plans prior to drought events to allow entities to “fare better than those who react when disaster is upon them.”

The LLNRD has an estimated district population of 68,746. Within the LLNRD, 43 municipal water system providers utilize groundwater as their primary source. While the Nebraska DHHS requires these water providers to have a Contingency/Emergency Response Plan in place, they are oftentimes not sufficient for severe or escalating drought events. A Drought Management Plan provides a more in-depth analysis including local drought definitions, levels, specific actions, and established protocols for sustaining water supplies. Engaging stakeholders across the district will form a regional approach to drought management which enables the LLNRD to utilize best drought management practices in a consistent and effective way.

Currently, the LLNRD is in Phase I of the Ground Water Management Program which requires a permit prior to construction of wells that pump over 50 gallons of water per minute and has an expanded education program for groundwater management practices. The LLNRD also completes annual reviews for water and deep soil for nitrogen content. However, current projects do not adequately discuss drought conditions and necessary responses. The Drought Management Plan will fill these gaps, while also complementing existing and ongoing planning efforts.

The goal of a Drought Management Plan is to reduce long-term impacts from drought events by mitigating vulnerabilities and improving response. If drought planning or preemptive actions are not taken, water supplies during drought events are at risk of being entirely depleted. These may cause severe damage to existing infrastructure, economic losses, environmental stress, and negative societal impacts on communities, business owners, residents, and agricultural producers.

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 Drought Management Plan is consistent with and complementary to multiple plans at the NRD and state level. These include: Lower Loup NRD Voluntary Integrated Management Plan (Table 9); Lower Loup NRD Long-Range Implementation Plan (Tables 10 and 11); Lower Loup NRD Hazard Mitigation Plan 2017 (Table 12); Lower Loup NRD Master Plan 2012-2022 (Table 13); and Nebraska’s Climate Assessment

Response Committee Drought Mitigation and Response Plan 2000 (Table 14). The following tables identify planning consistencies and projects that have been, or are being, implemented to help accomplish the plan goals related to drought planning. Table 15 lists completed projects the LLNRD has undertaken.

Table 9: Voluntary Integrated Management Plan Goals

Goal:	Objectives:
Promote and support a water supply and use inventory based on the best available data and analysis	<ul style="list-style-type: none"> • Develop and maintain a comprehensive inventory of the location and source of the District's current and future water supplies, water uses, and outflow. • Monitor current and future water demands in the basin. • Use best available science and technology to monitor water supplies. • Utilize existing policies and authorities of the District and the Department to address water quantity issues.
Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands	<ul style="list-style-type: none"> • Collaborate with state and local governments to identify opportunities to augment water supplies within the District and, if necessary, identify opportunities to supplement with imported water from outside the District. • Monitor the instream flow needs in the Lower Platte Basin to foster an understanding of any existing appropriation priorities and locations, and provide a basis for evaluating impacts of existing and future uses. • Evaluate options for water banking methodologies.
Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development	<ul style="list-style-type: none"> • Identify available water storage opportunities throughout the District. • Evaluate, understand, and develop policies to address impacts on stream flows resulting from uses outside of management control.
Continue public education programs that encourage water conservation measures	<ul style="list-style-type: none"> • Investigate and promote water use efficiency. • Continue public education and cost share programs to encourage conservation and best management practices.

Table 10: Long Range Implementation Plan Priorities

Priority Level	Description
1	Water Quality
2	Water Retention (surface water/storage/recharge/dams)
3	Protection of basin resources
	Buffer strips/streambank stabilization and maintenance/wetland management
4	Forestry – rural and urban/tree planting/shelter belts
5	New irrigated acres development
6	Public promotion/awareness/education in schools & clubs
7	Range Management
8	Wellhead protection
9	Soil conservation/system approach to no-till/cover crops

10	Habitat development/recreation/pivot corners/native plant restoration/species diversification for landscaping
11	Control of invasive weeds on rivers/streams
12	Project participation policies/process
13	Interaction with irrigation districts and municipalities
14	Parks/arboretum/recreational areas/trails/assistance
15	Cost-share practices/incentives (development) vs. penalties (efficiency)
16	Hunting/fishing/acres & access/habitat/wildlife/game birds
17	Sandhills wetland management and conservation
18	New land development
19	Ecotourism
	Additional funding for planned grazing systems
	Flood control/protection of municipalities/prioritize concern/problem areas flooding/damage
20	Role of land use in watersheds

Table 11: Long Range Implementation Plan Goals

Focus Area	Goal
Resource Awareness	Resource Awareness
Flood Protection	Prevent damage from flood water
Water Quantity	Development and management of groundwater and surface water for beneficial uses
Trees	Forestry management
Water Quality	Water quality and pollution control
Soil Erosion	Erosion prevention, control and sediment reduction
Range	Range management
Drainage Improvement	Drainage improvement and channel rectification
Fish and Wildlife	Development and management of fish and wildlife habitat
Habitat/Recreation	Development and management of recreational and park facilities

Table 12: Hazard Mitigation Plan Goals

Goal	Objective
Protect Public Health and Safety from Hazard Events	Groundwater Recharge
Protect Existing and New Properties from Hazard Events	Develop Drought Management Plan
Increase Public Awareness and Education about Hazard Events	Reduce Water Demand/Improve Drought Education
	Emergency Exercise: Drought Tournament
	Monitor Drought Conditions
	Monitor Water Supply
	Water System Improvements

Table 13: Master Plan 2012-2022 Goals and Objectives

Goal:	Objective:
Water Quality and	Provide local administration of the water quality sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.

Pollution Control	Provide local administration of the Nebraska chemigation Act Sections 46-1101 through 46-1148RRS, Nebraska 1943.
	Maintain and expand when necessary the District's water quality monitoring program to enhance the water quality database.
	Cooperate with cities and villages on public drinking water systems through the wellhead protection program utilizing watershed planning and promotion of wellhead protection zoning.
	Provide technical and financial support to individuals and government entities on water quality concerns and pollution prevention.
	Continue to support and assist private individuals on livestock pollution prevention and control systems.
	Develop and maintain educational programs to assist agricultural producers and urban homeowners on the use of pesticides and other environmentally sensitive chemicals.
Development and management of groundwater and surface water for beneficial uses	Provide local administration of the water quantity sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.
	Through basin-wide water management provide the framework necessary to protect and utilize the water supply for beneficial use by agriculture, municipalities, domestic and industrial users.
	Continue the present program for well monitoring.
	Track the interconnection of groundwater and surface water and manage the resource for conjunctive use in watershed planning.
	Encourage metering of irrigation withdrawals and provide leadership on programs to reduce over application of irrigation water.
	Monitor annual basin DNR reviews for fully appropriated status under LB952 and manage water resources to avoid such designation.
	Address integrated water management in the Loup River Basin.
	Continue work on Elkhorn Loup Modeling (ELM) Project and maintain data collection efforts.
	Continue flow meter cost-share program and utilize data to determine groundwater use in the basin.
	Encourage the efficient use of irrigation water through construction of reuse systems and use of water saving technology.
	Promote utilization of crop water use information.
	Provide local administration of the Ground Water Management and Protection Act found in State Statute 46-701 through 46-754 RSS, Nebraska 1943.
	Provide local administration and leadership on programs and policies regarding the administration of instream appropriations found in Sections 46-2,107 through 46-2,119 RRS, Nebraska 1943.
	Continue to promote a systematic program of maintenance on irrigation power units and adjustment of pumps to conserve energy and reduce pumping costs.
	Cooperate with irrigation districts on protection and development of groundwater and surface water.
	Act as local voice on transbasin divergence of surface waters to ensure that basin surface water needs are protected.
Cooperate with local, state, and federal agencies on water supply programs and problems.	

	Carry on comprehensive education programs on groundwater and surface water management.
Resource Awareness	Maintain a state of awareness on conservation, pollution, development, and all subjects relative to the mission and function of Natural Resources Districts.
	Continue to provide vigorous public information and education programs about natural resources conservation and the conservation programs offered through the NRD.
	Develop a close working relationship between NRD, news media, and the general public.
	Maintain an adequate system for in-house dissemination of information between directors and staff.
	Develop a system for director and staff attendance at meetings pertaining to resource development.
	Schedule tours for directors, staff, news media, and agency representatives within specific areas to develop awareness of problems within the District.
	Maintain close coordination with federal, state, and local agencies on problems and new techniques for resources development.
	Maintain and update the Hazard Mitigation Plan developed for communities, counties, and other governmental subdivisions in the District.
	Continue to pursue outside funding sources such as the Environmental Trust, 319, Resource Development Fund, and other sources for natural resources conservation.
	Provide adequate resources to fully implement the goals and objectives of this Master Plan.
Prevent Damage from flood waters	Through watershed planning and management, provide assistance with programs and projects to assist municipal and rural residences with flood control measures.
	Provide local, state, and federal governments with information on flooding potential and respond to needs when flooding occurs.
	Provide assistance to individuals as well as state and federal entities on floodplain zoning programs.
	Provide educational material on the threat of flooding and prevention of damage through zoning.
	Develop a program to construct storage reservoirs.
Forestry Management	Continue the District's program for establishment of farmstead, livestock, and field windbreaks.
	Maintain high standards for the District tree planting program to ensure survival.
	Continue to provide new and modern equipment to complement the established program.
	Cooperate with federal and state agencies to develop forestry plantings for timber production.
	Develop a comprehensive public information and educational program for forestry practices.
	Continue the cooperative agreement with the Nebraska Forest Service (NSF) on the staff forester position.
Erosion prevention, control and	To develop a complete and comprehensive program for erosion control on crop land, stream banks, and range land from both water and wind, controlling sedimentation at the source being the most economical means for control and reduction.

sediment reduction	<p>To carry on a continuing program of technical and financial assistance to farmers and ranchers for the application of basic soil and water conservation practices to be implemented in the following manner:</p> <ul style="list-style-type: none"> • Continue the basic memorandum of understanding with the United States Department of Agriculture (USDA); • Continue the supplemental memorandum of understanding with the Natural Resources Conservation Service (NRCS8051S) to control erosion and sedimentation on agricultural land; • Work closely with the Farm Service Agency (FSA), Congress, and the State of Nebraska to maintain conservation cost-share assistance programs and strive to increase those funds both nationally and in Nebraska; and, • Provide local tax funds when available and practical to supplement Federal and State funded cost-share programs
	<p>Provide the local leadership to administer the Erosion and Sediment Control Act as found in State Statues 2-4601 through 2-4613, RRS, Nebraska 1943.</p>
	<p>Continue the program of assistance to counties and other governmental agencies for construction of flood control road structures on public highways until such time that the NRD feels that it has adequately demonstrated the economical benefit of such a program. The program to be implemented as follows:</p> <ul style="list-style-type: none"> • Provide assistance in a manner prescribed by the Board; • Request survey and design by the Natural Resources Conservation Service; • Strive to implement other programs district-wide; and, • Provide engineering assistance from sources other than NRCS, when necessary
	<p>Provide assistance to cities and villages for urban subdivision development erosion problems.</p>
	<p>Continue to support the soil survey program:</p> <ul style="list-style-type: none"> • Seek assistance from the NRCS to maintain the most up-to-date scientific soil survey data; and, • Make available and disseminate completed and published information
	<p>Provide assistance to individuals and governmental entities on streambank erosion.</p>
	<p>Continue to provide technical assistance on range management practices:</p> <ul style="list-style-type: none"> • Provide, through special initiations and grant programs, additional range management field staff to work with constituents.
Range Management	<p>Continue to promote the conversion of crop land to grass on those land classifications that are less suitable for farming.</p>
	<p>Provide services for seeding when not available from private enterprise.</p>
	<p>Continue to promote planned grazing systems in cooperation with federal and state agencies.</p>
	<p>Continue to promote control of native and non-native invasive species through mechanical/chemical means, and/or controlled burns.</p>
	<p>Employ range specialist on the District level as the need develops.</p>

Drainage improvement and channel rectification	Utilize the special projects sections of the NRD Law to assist local communities on drainage and channel rectification problems.
	Provide the necessary engineering and construction assistance to those communities with drainage and channel projects that will not have an adverse effect on the environment.
Development and management of fish and wildlife habitat	Provide adequate habitat for wildlife, including food, water, and shelter.
	Create wildlife buffers between urban and rural landscapes.
	Promote and provide assistance for the preservation, protection, and enhancement of wildlife habitat.
	Continue to provide funding for approved wildlife habitat programs.
	Continue to develop and provide public access for hunting, fishing, and outdoor activities.
	Develop the Davis Creek and Pibel Lake fisheries.
	Provide for and protect threatened and endangered species in the District.
	Provide fishery habitat, waterfowl habitat, and upland game bird habitat on District construction projects, whenever possible.
Development and management of recreational and park facilities	Carry on a continuing educational program to emphasize the need to protect all types of habitat.
	Provide recreational facilities on district projects when opportunities are presented.
	Provide recreational trails when opportunities are presented.
	Consider NRD sponsorship of recreational development in conjunction with federal and state projects.
	Provide for construction of multi-benefit projects, where recreation is combined with water storage, groundwater recharge, stream augmentation and other purposes.
	Provide financial and technical assistance to city and county government for park development.
Solid waste recycling and disposal	Continue to offer and expand recreational opportunities at Davis Creek Reservoir, Pibel Lake Recreation Area, and Headquarters Arboretum.
	Assist those responsible governmental agencies on establishment of sanitary landfills.
	Provide technical assistance on soils, water tables, and site selection.
	Provide technical assistance and engineering for on-site evaluation of erosion, sediment, flood control, and water quality monitoring.
	Provide information on solid waste issues and regulations to the public.
	Promote and provide technical and financial assistance to communities for recycling programs.

Table 14: Nebraska's Climate Assessment Response Committee (CARC) Drought Mitigation and Response Plan, 2000

Impact	Planned Actions	Assistance Agencies
Reduced range and pasture forage and livestock water results in poor animal health, soil erosion, and possible economic loss to ranchers	Encourage the use of range and pasture management techniques such as reduced stocking rates, reserve pastures, rotational grazing, removing competitive plants and stored feed to improve	National Grassland Association, Nebraska Cattlemen, UNL Extension, NRCS, NRDs, Sandhills Cattle Association

Impact	Planned Actions	Assistance Agencies
	sustainability of rangelands under drought conditions.	
	Prior to and during drought, use public information programs and on-site visits to emphasize importance of rangeland management and planning to equalize stocking rates with available forage and the need for permanent water storage and distribution systems.	UNL Extension, NRDs, NEDA, DNR, NRCS, NDMC
	Monitor forage supplies and conditions around the state and facilitate information exchange between interested parties. A) If conditions warrant, a meeting of a forage advisory committee will be organized early in the spring to determine hay stock availability, forage conditions, and wildlife concerns. B) Also, at that meeting, the procedure for emergency roadside haying through the Department of Roads could be discussed to determine need and value of this procedure. C) Also, at that meeting, it could be determined if a letter to the federal office of FSA is warranted to forewarn them of drought conditions and impending requests for CRP emergency release; this group would pass that recommendation on to CARC, who would then pass the request for the letter on to the Governor and the Director of Agriculture.	UNL Extension, NRDs, NEMDA, NRCS, DNR, NDMC, FSA, Nebraska Cattlemen, Farm Bureau, Alfalfa Association, Nebraska Department of Roads
	Assist ranchers in obtaining supplemental income by connecting them with employment opportunities, and during drought, by holding job fairs and raising general	Nebraska Department of Labor, NEDA, UNL Extension, NRDs, Center for Rural Development

Impact	Planned Actions	Assistance Agencies
	awareness of job opportunities and ranchers' work skills.	
	Establish and activate a statewide and nationwide hotline system for locating economical feedstock sources.	NEDA, UNL Extension, Nebraska Cattlemen, National Guard, Farm Bureau, NEMA, NRDs, NRCS, Alfalfa Association
Reduced soil moisture on dry cropland poses economic loss to farmers and possible increased soil erosion and blowing dust	Use public information programs to emphasize installation of soil and water conservation systems (i.e., terraces, crop residue use, and contour planting).	NRCS, SSARE, DEQ, UNL Extension, NRDs
	Emphasize additional measures regarding crop residue management, grassing terraces and emergency tillage to control soil blowing.	NRCS, SARE, DEQ, UNL Extension, NRDs
	Investigate use of rainfall enhancement projects in targeted areas.	NEDA, DNR, NRDs
Decreased irrigation water from surface water sources prevents achievement of crop harvest potential	Emphasize adjustment of irrigated acre age to meet expected water availability.	DNR, NRDs, NRCS, Irrigation Districts, UNL Extension, USBR
	Develop a funded loan program to encourage installation of on-farm water conservation measures.	USBR, DNR, DEQ, NRDs
Increased irrigation pumping from underground water sources may lower water levels and decrease pumping rates resulting in less capacity to meet crop needs and decreasing the profitability of an irrigated cropping system	Continue to emphasize irrigation water management techniques and develop emergency loan program to promote installation of on-farm water conservation measures.	NRDs, USBR, DEQ, NRCS, UNL Extension, FSA, NEDA
	Maintain water-level measurement program to monitor declining aquifer levels.	NRDs, UNL CSD
	Maintain groundwater metering efforts and establish an emergency allocation program.	NRDs
Loss of farmers and ranchers due to drought-induced bankruptcy	Encourage continuation of federal emergency indemnity plans for crop and livestock agriculture.	NEDA, FSA, NRDs
Increased health problems for residents of areas	Communicate with state medical allergy and asthma	UNMC, UNL Extension, NRDs, NRCS, local health

Impact	Planned Actions	Assistance Agencies
<p>experiencing problems from blowing dust (Also included within the Municipal Water Supply, Health, and Energy Subcommittee plan)</p>	<p>experts to develop recommendations.</p>	<p>offices, environmental health fund, NEMA, HHS</p>
	<p>Establish education programs to increase awareness of dust-related respiratory problems and how proper land management can improve air quality.</p>	
	<p>Develop funded initiatives to explore mitigation of health effects.</p>	
<p>Due to drought, many public water supply systems experience potable water demand problems</p>	<p>Emphasize, and evaluate, long and short-term drought contingency plans for all systems.</p>	<p>NHHS, League of Municipalities, NRDs, Nebraska Rural Water Association, NDEQ, AWWA, CED/UNL</p>
	<p>Emphasize indoor and outdoor water conservation measures.</p>	
	<p>Maintain list of “problem systems”, with history or potential for drought-related problems.</p>	
	<p>Develop programs and educate the public on the potential uses of wastewater.</p>	
	<p>Develop partnerships with utility companies and others who can help distribute drought-related information.</p>	
<p>Many rural water districts and small public water systems (under 10,000 population) develop operational (mechanical) problems when operating for extended periods of drought</p>	<p>Maintain list of “problem systems” with history or potential for drought-related problems.</p>	<p>NRWD, NEMA, Nebraska Section of AWWA, Nebraska Department of Economic Development (NDED), USDA Rural Development, League of municipalities, NHHS, Midwest Assistance Program, NDEQ, UNL Extension, NRDs, Groundwater Foundation, Nebraska Department of Natural Resources, Nebraska Rural Water Association (NeRWA), EPA</p>
	<p>Continue work with systems to develop a plan of long-term drought mitigation and short-term drought response actions.</p>	
	<p>Maintain communication means and use NeRWA newsletter and training sessions to address drought-related issues.</p>	
	<p>Explore, as needed, emergency funds.</p>	
<p>Due to drought, private wells experience water quality and quantity problems</p>	<p>Encourage NRDs to evaluate situation.</p>	<p>NRDs, CSD/UNL, CED/UNL</p>
	<p>Emphasize indoor and outdoor water conservation measures.</p>	

Impact	Planned Actions	Assistance Agencies
Increased irrigation may overdraft available aquifer and affect municipal and rural water supplies during drought	Promote groundwater-metering efforts and establish an emergency allocation program.	NRDs, Bureau of Reclamation, DOE, CSD/UNL, CED/UNL, USGS
	Encourage statewide water level measurement program to effectively monitor aquifer levels.	
Increased presence of large, industrial, independent water users may overdraft available aquifers during drought	Maintain a list of large, industrial, independent water users.	NRDs, NDED, CSD/UNL, Nebraska Department of Natural Resources, League of Municipalities, CED/UNL
	Enhance communication between large, independent water users and municipal suppliers to implement water conservation and drought-preparedness guidelines.	
Increased health problems for residents of areas experiencing blowing dust problems from drought affected agricultural lands	Communicate with state medical allergy and asthma experts to develop recommendations.	NHHS, UNMC, CED/UNL, NRDs, NRCS, Nebraska Emergency management Agency (NEMA), local health offices, environmental health fund
	Establish education programs to increase awareness of dust related respiratory problems and how soil and land conservation practices can improve air quality.	
	Develop funded initiatives to explore mitigation of health effects.	

Table 15: Recently Completed Projects

Project	Description
Annual Review and Update of Groundwater Management Plan	The LLNRD annually reviews and updates the Groundwater Management Plan to maintain consistency with local and state regulations.
Annual Groundwater Monitoring	The LLNRD collects groundwater measurements annually. The measurements are taken across the NRD to monitor the District's groundwater levels.
Clear Creek/Pibel Lake Survey	2014 survey of property owners and residents of the Clear Creek Watershed to develop a list of usable best management practices to improve water quality and conservation in the watershed.
South Loup River Watershed Plan	The 2017 plan was a comprehensive evaluation of the water resources in the watershed, both surface water and groundwater, as well as quality and quantity and how they are interrelated.

Airborne Electromagnetic (AEM) Survey	Study that involves flying a helicopter with a structure that maps the aquifer by sending electromagnetic pulses into the ground.
Annual Budget	The LLNRD budgets approximately \$1.5 million annually for water quantity projects.
Wellhead Protection Program	The LLNRD assists communities within the district with their Wellhead Protection Program by monitoring groundwater quality. The NRD tests domestic, irrigation, and stock wells for water quality.
Columbus Area Water Resources Assessment Study	The 2016 study of the area around the city of Columbus assessed the area's hydrology, groundwater, potential recharge projects, water budget, and development of a detailed groundwater model.

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

List the following information that is applicable:

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

The project will include HDR conducting a preliminary assessment of areas that could be potential groundwater recharge and/or augmentation sites. This would include a review of all existing regional groundwater flow models, available groundwater data, water level trends, existing reports and studies, topography, soil, land cover, irrigation practices, and pumping records as well as discussions with NRD staff and stakeholders. The intent will be to identify general locations on a map where acceptable and practical groundwater recharge projects and land management practices could help the LLNRD achieve water sustainability goals.

The main objective for this project is developing a plan and procedure for the district to effectively manage water resources during periods of low-flow or drought conditions. This process will work to reduce aquifer depletion through proper and proactive management techniques. The Drought Management Plan will consider surface retention alternatives that will result in aquifer recharge. The Plan will also utilize these resources to retine water release to be most beneficial for the District. In addition, defining drought by utilizing local data will allow for more effective management of water use, leading to positive impacts on streamflow during low-flow periods. Plan benefits, including improved monitoring and management of water resources, will allow the LLNRD to provide additional resources for downstream management.

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;

- List the goals the project provides benefits.
- Describe how the project will provide these benefits
- Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

The goal of this project is to provide a proactive operational framework that identifies appropriate mitigation and response actions to minimize the occurrence of low-flow conditions in municipal water supplies across the LLNRD. Outcomes from the planning effort will be targeted at improving the reliability of water supplies through the District, as well as positively impacting neighboring basins. Benefits include more sustainable supplies of drinking water, and potentially reduced water treatment and administrative costs. In addition to the monetary benefits, this project will result in an operational framework that is environmentally beneficial.

To accomplish these goals, the LLNRD with assistance from JEO will document historic drought events and their impacts; identify district-specific vulnerabilities and risks; include a specific local definition for drought; outline a local monitoring protocol; establish mitigation alternatives; and create a proactive, risk management-based response structure including triggers for actions.

According to the University of Nebraska-Lincoln publication “Understanding and Assessing Climate Change: Implications for Nebraska” (<http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>) it is very likely that Nebraska will experience more frequent and severe drought events in the coming decades. A combination of rising temperatures and increased seasonal variability increases potential stress on established water systems. Many communities across the district are growing, with 23 jurisdictions experiencing 10% or greater growth between 2010 and 2016 (US Census Bureau). As these communities continue to grow, it is a priority of the NRD to protect and manage water resources for all users.

Additionally, the Drought Management Plan will produce long-term benefits by engaging local stakeholders throughout the process. This active involvement will include a Drought Tournament facilitated by JEO. Drought tournaments were developed in Canada for use in national-level planning efforts. Since that time, JEO has adapted the concept to fit local planning efforts. With input from NRD staff, JEO will create a plausible drought scenario utilizing historic data. This scenario will be presented to a broad cross section of stakeholders during a public tabletop style meeting. Stakeholders will be asked to identify mitigation and response activities they believe would be successful. Some benefits of this approach include cross sector education, and increased understanding of the dynamic stressors drought places on various sectors, and maybe most importantly, the opportunity to talk about drought induced needs in a

non-confrontational setting. A continuation of the status quo increases risk of disjointed and conflicting regulatory processes between communities, which may cause damage to infrastructure, increased stress on industry, and negative impacts to natural environments.

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 identify the most effective mitigation and response actions consistent with other District planning mechanisms. Importantly, this project will work to stabilize and ensure water supply resilience through droughts and maximize the water supplies available within the District. Water users across multiple sectors (agricultural, industrial, municipal, etc.) will directly benefit from this Drought Mitigation Plan. In addition to identifying drought mitigation alternatives and response protocols, this project will increase flows during periods of drought. These increased flows will likely protect habitat across the District, including for threatened and endangered species.

No reductions in beneficial uses have been identified as part of this project. Adaptive water use, specific to periods of drought, will result from this project. Furthermore, a drought tournament will be used during this planning process to engage District stakeholders, connecting and building strong relationships. The drought tournament will bring together a wide spectrum of sectors (agriculture, industry, municipal, regulator, etc.) to better understand the management techniques currently in place and examine what other practices might be more beneficial. The drought tournament is based on a hypothetical scenario rooted in past drought experiences. The potential impacts of a multi-year drought event will be examined by tournament participants, encouraging important partnerships between participants, stakeholders, and the LLNRD. The drought tournament format has been used several times across North America, with NRDs in Nebraska being the first to use it at the watershed level with the goal of developing better monitoring and management processes.

This project benefits state residents in many ways. The NRD serves an estimated population of 68,746 representing 3.65% of the state’s population. Many communities across the region have experienced population growth, including 23 jurisdictions experiencing growth rates greater than 10% since 2010. As the population in these areas continue to increase, it is important to consider how best to manage water resources. Even beyond the boundaries of the LLNRD, this project extends its benefits. Not only for consumption and production, Nebraskan recreational activities are an important recipient of drought planning’s more sustainable water supply. A major draw to the LLNRD is the many recreational areas including Calamus Reservoir. The Calamus State Recreation Area is one of Nebraska’s most popular places for camping,

fishing, boating, picnicking, and hiking. A sustainable water supply is critical for the activities located at this and other recreational areas throughout the District. Therefore, in a variety of areas, planning for periods of insufficient supply positions the LLNRD not as crisis responders, but as risk managers, as outlined and recommended by research and publications provided by the National Drought Mitigation Center.

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.

Hazard mitigation planning is the most cost-effective method of building resilience to natural and man-made hazards. The National Institute of Building Science's 2017 report "Natural Hazard Mitigation Saves Study" (<https://www.fema.gov/media-library/assets/documents/156979>) found that for every \$1 spent through hazard mitigation, entities save \$6 in potential future losses.

The total cost of the project is \$87,100. No construction, O/M, land or water acquisition, or other costs are expected during the development of the Drought Management Plan. The cost of the plan is broken down into several components, which are listed below with a brief description:

1. Project Management:

- JEO will develop a project management plan that includes: framework for project related communications, proposed project schedule, anticipated project milestones, and project deadlines.
- This task which JEO will complete includes but is not limited to: meetings and correspondence with local, state, and federal agencies as required; responding to stakeholder questions and request for information.
- JEO will coordinate services provided by sub-consultants to ensure service delivery meets the project schedule and budget.
- JEO, HDR, and the LLNRD will attend a project kickoff meeting. JEO will develop meeting materials to include: meeting agenda, proposed project schedule.

2. Data Collection:

- JEO will compile, assess, and summarize all available water resources data for the Lower Loup Basin and develop an inventory for available resources.
- JEO will collect and review regional and state planning mechanisms related to drought and water resources management. These may include, but are not limited to: Master Plan, Long-Range Implementation Plan, Hazard Mitigation Plan, Voluntary Integrated Management Plan, Watershed Management Plan, and/or other local/municipal Water Emergency Contingency Plans.

- JEO will collect and analyze records of past drought events, including severity, damages, and duration. Data sources may include: Palmer Drought Severity Index, Standard Precipitation Index, USGS stream gages, NRD well monitoring records, NCEI Severe Weather Database, and others.
3. Public and Stakeholder Engagement
 - The LLNRD with assistance from JEO will host a drought tournament to engage stakeholders across the district from various sectors including: agriculture, industry, municipal, regulator, residents, etc. The tournament will evaluate current management protocols, identify gaps and vulnerabilities, and determine new or more beneficial practices. The tournament presents a hypothetical scenario based on past historical event and leads stakeholders through a multi-year response. The scenario is designed to foster relationships and partnerships across jurisdictions, stakeholders, and the LLNRD. Drought tournaments have been used across the country, while Nebraska is the first to apply them to regional watershed management.
 - JEO will lead the setup, facilitation, and documentation of project related meetings with stakeholders and the public.
 - JEO will coordinate with the LLNRD to construct a program to update the public on drought management activities.
 - LLNRD with assistance from JEO will develop press releases, social media prompts, flyers, and surveys necessary to engage the public.
 4. Drought Management Plan
 - JEO in coordination with the LLNRD will identify drought-specific vulnerabilities (vulnerable populations, critical management periods, past water shortages, etc.).
 - JEO and HDR in coordination with the LLNRD and the stakeholder/steering committee will identify potential best management practices that could be promoted and/or implemented within the district that will reduce drought impacts, help proactively prepare for drought, and provide awareness during drought events.
 - JEO will identify potential partners and funding opportunities the LLNRD and stakeholders can utilize to implement best management practices.
 5. Recharge Projects
 - HDR in coordination with JEO and the LLNRD will identify and analyze potential groundwater recharge areas and land management practices to augment water levels within the watershed basin.
 - HDR will determine priority monitoring sites for the LLNRD to continue to conduct water quality and quantity assessment.
 6. Develop Drought Monitoring Protocol
 - LLNRD with assistance from JEO will develop a protocol for local drought monitoring and forecasting by using locally established drought thresholds through historical data and stakeholder input.
 - JEO will provide the protocol and links to drought monitoring resources to the LLNRD for inclusion on their website.

The funds being requested will be used to develop a Drought Management Plan. If this project is not funded through this grant, the alternatives will be to either: a) pursue funding of the project by utilizing local funds or, b) to not pursue the project. If a Drought Management Plan is not developed, based on information included in the Understanding and Assessing Climate Change: Implications for Nebraska (<http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>), it is probable that drought events will occur with increased frequency and have a more profound negative impact in the future. The report states "...the expectation is that drought frequency and severity in Nebraska will increase, particularly during the summer months because of the combination of increasing temperatures and increased seasonal variability...even if precipitation amounts remain the same or slightly increase in the future for Nebraska, already vulnerable water resources across the state will be stressed even further by these increased temperatures" (Bathke et al, 2014). If efforts are not taken to proactively manage the risks that drought poses to the District, it will be more challenging to manage risk. This lack of preparation will result in reactive crisis response during future drought events.

This project is additionally beneficial because the development a local drought monitoring process will be used for years to come. The local drought monitor will be available to the LLNRD and District-wide stakeholders. The local drought monitor paired with the drought tournament will provide opportunities for robust stakeholder engagement and education. The LLNRD Drought Management Plan will also be able to shape other local drought planning efforts by cultivating data and information and establishing a response protocol that will impact all sectors (agriculture, industry, municipal, etc.) for years into the future.

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

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

The deficiencies that occur now are related to periods of drought and low-flow conditions throughout the District. When there is insufficient precipitation to facilitate recharge, District stakeholders (primarily agricultural and municipal) are concerned. Agricultural water supplies are critical to the economic health of the District and the state. When area crops and livestock are threatened, the economic impacts are felt within the District and beyond. In addition, periods of drought can interfere with ground water supplies. The interference with ground water supplies can impact municipal water systems in two ways. First, water table drawdowns have made municipal (and private drinking water) wells unproductive. Secondly, an increased concentration of chemicals

in ground water supplies develop during drought events. As ground water resources are depleted, the remaining water has a higher concentration of chemicals which can render the remaining water supply unsafe for human consumption.

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.

While many impacts of drought are non-structural, there is the potential structural damages can occur during prolonged or severe events. Potential damages may include shifting or cracking of roadways and buried utilities from ground subsidence or damage to wells during drawdown. Drought may often coincide with extreme heat events, exacerbating economic losses, social stress, agricultural production, and environmental degradation. This Drought Management Plan will define local drought definitions and identify potential actions to maintain stable water supplies. An example of how regulatory actions can reduce damages to roadways and underground utilities includes using water restrictions to limit outdoor irrigation. By using irrigation supplies more judiciously, water supplies should be available for a longer period of time. This prolonged availability of water will allow for better irrigation practices, thereby decreasing soil moisture depletion.

While the scope of this project does not include quantifying the reduction of impacts to infrastructure due to this plan development, multiple types of infrastructure will benefit from the plan including but not limited to: underground utilities, roads and highways, domestic/municipal/agricultural wells, housing, and commercial buildings. Additionally, non-physical systems such as community trees and greenspaces benefit from drought planning efforts. Currently, three communities (Broken Bow, Columbus, and Ord) throughout the district participate in the Arbor Day Foundation Tree City USA program. Community trees provide shade to residents, help slow storm water run-off, stabilize stream and river banks, increase soil permeability, increase community aesthetic and improve resident immigration and retention.

Water security and conflict are strongly linked. Drought planning increases a region's ability to cope in times of water shortage, prolonged drought events, or periods of low-flow. While the United States has been fortunate to avoid major conflicts over water supply due to drought, other parts of the world have demonstrated the tense relationships between water providers and users when supply is low. Droughts in India

in 2017, water mismanagement in Yemen, and water scarcity in Egypt all provide examples of water shortage events which escalated into violent conflict (<http://dx.doi.org/10.5942/jawwa.2015.107.0042>). Recently, prolonged drought and water shortages in California has been linked to rising crime trends (<https://doi.org/10.1371/journal.pone.0185629>).

Additionally, drought has significant and lasting impacts on public health. The CDC's report "When Every Drop Counts: Protecting Public Health During Drought Conditions" (https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf) attributes drought impacts to deteriorated quantity and quality of water, compromised food and nutrition, diminished living conditions, and increases in disease incidence and transference. Undertaking drought planning means LLNRD can build resiliency in the likelihood of future drought events, preventing conflict and public health issues from severely hindering the region.

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 CDC's report "When Every Drop Counts: Protecting Public Health During Drought Conditions" (https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf) attributes drought impacts to deteriorated quantity and quality of water, compromised food and nutrition, diminished living conditions, and increases in disease incidence and transference. Undertaking drought planning means LLNRD can build resiliency in the likelihood of future drought events, preventing water quality and quantity issues.

The State of Nebraska's economy is heavily dependent on agriculture. Agricultural practices directly impact water quality and quantity, especially through the use of fertilizers and herbicides with high nitrogen. Parts of the district, including the southern parts of Merrick, Nance, and Platte counties, have continually struggled with high nitrates (<https://www.llnrd.org/assets/site/LLNRDNMgtAreaPhaseSumupdate.pdf>). Factors impacting nitrate levels include a shallow water table, sandy soils, high groundwater recharge rates, and agricultural producers over-applying fertilizer. During periods of drought, contamination of water resources can be intensified.

A Drought Management Plan helps protect the water supply for all users within the region, as well as has far-reaching benefits to users in neighboring subbasins. The NRD serves an estimated population of 68,746, including 43 water providers. Water supplies throughout the district are used for residential, agricultural, industrial, municipal, and recreational purposes. Through the development of this plan, identification of local

drought definitions, thresholds, actions, and responses will enable water regulators to follow best management practices.

Other possible solutions to addressing water quality and quantity during drought periods include: increasing surface retention of water supplies; decreasing agrichemical applications; adapting agricultural practices to reduce run-off such as tiered planting; additional water treatment systems for municipal supplies. The LLNRD is currently working to reduce nitrate levels through their three phase Groundwater Quality Management Plan. However, other solutions to address these problems can be extremely costly. This Drought Management Plan will bolster ongoing projects as well as identify potential future mitigation actions the district can undertake to protect water users and existing infrastructure. These projects and policies benefit not only the district, but surrounding subbasins, providing the most cost-effective method of water management planning.

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 LLNRD is the lead agency associated with this project. Stakeholders across the district will be invited to engage throughout the planning process, especially through the use of a Drought Tournament. Drought tournaments were developed in Canada for use in national-level planning efforts. Since that time, JEO has adapted the concept to fit local planning efforts. With input from NRD staff, JEO will create a plausible drought scenario utilizing historic data. This scenario will be presented to a broad cross section of stakeholders during a public tabletop style meeting. Stakeholders will be asked to identify mitigation and response activities they believe would be successful. Some benefits of this approach include cross sector education, and increased understanding of the dynamic stressors drought places on various sectors, and maybe most importantly, the opportunity to talk about drought induced needs in a non-confrontational setting. Drought tournaments have been used across the country, while Nebraska is the first to apply them to regional watershed management.

The LLNRD is funded through a property tax levy, the current levy is \$0.030083 dollars per \$100 valuation. The NRD has stated in its financial commitment letter, a financial commitment to support this project. The total project cost of \$87,100 will be split between grant funding by the Water Sustainability Fund (60%) and the NRD local budget (40%). See Appendix A for a financial commitment letter. See table below for a project budget summary.

Task	Total Cost
Project Management	\$10,000

Data Collection	\$8,250
Public and Stakeholder Engagement	\$25,250
Drought Management Plan	\$25,000
Recharge Projects	\$15,000
Drought Monitoring Protocol	\$3,600
Total	\$87,100

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

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

The LLNRD is the lead agency associated with this project, but the Drought Management Plan will benefit all jurisdictions within the district. The LLNRD has completed several plans to support their overall goals of protecting and managing Nebraska’s groundwaters including: Voluntary Integrated Management Plan (Table 16); LLNRD Long-Range Implementation Plan (Table 17 and 18); LLNRD Hazard Mitigation Plan (Table 19); LLNRD Master Plan 2012-2022 (Table 20).

The NRD serves an estimated population of 68,746. All water users throughout the district will benefit from the Drought Management Plan. These users represent a diverse range of sectors impacted by water management including agriculture, industry, municipal, recreation, and residential users. Stakeholders who may be involved in the process include the NRD, landowner/operators within the district, community and county personnel, water dependent businesses, and other government agencies. A drought tournament will be utilized to engage stakeholders across the district. Drought tournaments were developed in Canada for use in national-level planning efforts. Since that time, JEO has adapted the concept to fit local planning efforts. With input from NRD staff, JEO will create a plausible drought scenario utilizing historic data. This scenario will be presented to a broad cross section of stakeholders during a public tabletop style meeting. Stakeholders will be asked to identify mitigation and response activities they believe would be successful. Some benefits of this approach include cross sector education, and increased understanding of the dynamic stressors drought places on various sectors, and maybe most importantly, the opportunity to talk about drought induced needs in a non-confrontational setting. Drought tournaments have been used across the country, while Nebraska is the first to apply them to regional watershed management.

Table 16: Voluntary Integrated Management Plan Goals

Goal:	Objectives:
Promote and support a water supply and use inventory based on the best available data and analysis	<ul style="list-style-type: none"> • Develop and maintain a comprehensive inventory of the location and source of the District’s current and future water supplies, water uses, and outflow. • Monitor current and future water demands in the basin • Use best available science and technology to monitor water supplies. • Utilize existing policies and authorities of the District and the Department to address water quantity issues.
Implement this water management plan to maintain an efficient and economical balance between current and future water supplies and demands	<ul style="list-style-type: none"> • Collaborate with state and local governments to identify opportunities to augment water supplies within the District and, if necessary, identify opportunities to supplement with imported water from outside the District. • Monitor the instream flow needs in the Lower Platte Basin to foster an understanding of any existing appropriation priorities and locations, and provide a basis for evaluating impacts of existing and future uses. • Evaluate options for water banking methodologies.
Develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses while allowing for future water development	<ul style="list-style-type: none"> • Identify available water storage opportunities throughout the District. • Evaluate, understand, and develop policies to address impacts on stream flows resulting from uses outside of management control.
Continue public education programs that encourage water conservation measures	<ul style="list-style-type: none"> • Investigate and promote water use efficiency. • Continue public education and cost share programs to encourage conservation and best management practices.

Table 17: Long Range Implementation Plan Priorities

Priority Level	Description
1	Water Quality
2	Water Retention (surface water/storage/recharge/dams)
3	Protection of basin resources Buffer strips/streambank stabilization and maintenance/wetland management
4	Forestry – rural and urban/tree planting/shelter belts
5	New irrigated acres development
6	Public promotion/awareness/education in schools & clubs
7	Range Management
8	Wellhead protection
9	Soil conservation/system approach to no-till/cover crops
10	Habitat development/recreation/pivot corners/native plant restoration/species diversification for landscaping
11	Control of invasive weeds on rivers/streams
12	Project participation policies/process
13	Interaction with irrigation districts and municipalities

14	Parks/arboretum/recreational areas/trails/assistance
15	Cost-share practices/incentives (development) vs. penalties (efficiency)
16	Hunting/fishing/acres & access/habitat/wildlife/game birds
17	Sandhills wetland management and conservation
18	New land development
19	Ecotourism
	Additional funding for planned grazing systems
	Flood control/protection of municipalities/prioritize concern/problem areas flooding/damage
20	Role of land use in watersheds

Table 18: Long Range Implementation Plan Goals

Focus Area	Goal
Resource Awareness	Resource Awareness
Flood Protection	Prevent damage from flood water
Water Quantity	Development and management of groundwater and surface water for beneficial uses
Trees	Forestry management
Water Quality	Water quality and pollution control
Soil Erosion	Erosion prevention, control and sediment reduction
Range	Range management
Drainage Improvement	Drainage improvement and channel rectification
Fish and Wildlife	Development and management of fish and wildlife habitat
Habitat/Recreation	Development and management of recreational and park facilities

Table 19: Hazard Mitigation Plan Goals

Goal	Objective
Protect Public Health and Safety from Hazard Events	Groundwater Recharge
Protect Existing and New Properties from Hazard Events	Develop Drought Management Plan
Increase Public Awareness and Education about Hazard Events	Reduce Water Demand/Improve Drought Education
	Emergency Exercise: Drought Tournament
	Monitor Drought Conditions
	Monitor Water Supply
	Water System Improvements

Table 20: Master Plan 2012-2022 Goals and Objectives

Goal:	Objective:
Water Quality and Pollution Control	Provide local administration of the water quality sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.
	Provide local administration of the Nebraska chemigation Act Sections 46-1101 through 46-1148RRS, Nebraska 1943.
	Maintain and expand when necessary the District's water quality monitoring program to enhance the water quality database.

	Cooperate with cities and villages on public drinking water systems through the wellhead protection program utilizing watershed planning and promotion of wellhead protection zoning.
	Provide technical and financial support to individuals and government entities on water quality concerns and pollution prevention.
	Continue to support and assist private individuals on livestock pollution prevention and control systems.
	Develop and maintain educational programs to assist agricultural producers and urban homeowners on the use of pesticides and other environmentally sensitive chemicals.
Development and management of groundwater and surface water for beneficial uses	Provide local administration of the water quantity sections of the Groundwater Management and Protection Act and Groundwater Management Plan rules and regulations adopted by the Lower Loup NRD.
	Through basin-wide water management provide the framework necessary to protect and utilize the water supply for beneficial use by agriculture, municipalities, domestic and industrial users.
	Continue the present program for well monitoring.
	Track the interconnection of groundwater and surface water and manage the resource for conjunctive use in watershed planning.
	Encourage metering of irrigation withdrawals and provide leadership on programs to reduce over application of irrigation water.
	Monitor annual basin DNR reviews for fully appropriated status under LB952 and manage water resources to avoid such designation.
	Address integrated water management in the Loup River Basin.
	Continue work on Elkhorn Loup Modeling (ELM) Project and maintain data collection efforts.
	Continue flow meter cost-share program and utilize data to determine groundwater use in the basin.
	Encourage the efficient use of irrigation water through construction of reuse systems and use of water saving technology.
	Promote utilization of crop water use information.
	Provide local administration of the Ground Water Management and Protection Act found in State Statute 46-701 through 46-754 RSS, Nebraska 1943.
	Provide local administration and leadership on programs and policies regarding the administration of instream appropriations found in Sections 46-2,107 through 46-2,119 RRS, Nebraska 1943.
	Continue to promote a systematic program of maintenance on irrigation power units and adjustment of pumps to conserve energy and reduce pumping costs.
	Cooperate with irrigation districts on protection and development of groundwater and surface water.
Act as local voice on transbasin divergence of surface waters to ensure that basin surface water needs are protected.	
Cooperate with local, state, and federal agencies on water supply programs and problems.	
Carry on comprehensive education programs on groundwater and surface water management.	
Resource Awareness	Maintain a state of awareness on conservation, pollution, development, and all subjects relative to the mission and function of Natural Resources Districts.

	Continue to provide vigorous public information and education programs about natural resources conservation and the conservation programs offered through the NRD.
	Develop a close working relationship between NRD, news media, and the general public.
	Maintain an adequate system for in-house dissemination of information between directors and staff.
	Develop a system for director and staff attendance at meetings pertaining to resource development.
	Schedule tours for directors, staff, news media, and agency representatives within specific areas to develop awareness of problems within the District.
	Maintain close coordination with federal, state, and local agencies on problems and new techniques for resources development.
	Maintain and update the Hazard Mitigation Plan developed for communities, counties, and other governmental subdivisions in the District.
	Continue to pursue outside funding sources such as the Environmental Trust, 319, Resource Development Fund, and other sources for natural resources conservation.
	Provide adequate resources to fully implement the goals and objectives of this Master Plan.
Prevent Damage from flood waters	Through watershed planning and management, provide assistance with programs and projects to assist municipal and rural residences with flood control measures.
	Provide local, state, and federal governments with information on flooding potential and respond to needs when flooding occurs.
	Provide assistance to individuals as well as state and federal entities on floodplain zoning programs.
	Provide educational material on the threat of flooding and prevention of damage through zoning.
	Develop a program to construct storage reservoirs.
Forestry Management	Continue the District's program for establishment of farmstead, livestock, and field windbreaks.
	Maintain high standards for the District tree planting program to ensure survival.
	Continue to provide new and modern equipment to complement the established program.
	Cooperate with federal and state agencies to develop forestry plantings for timber production.
	Develop a comprehensive public information and educational program for forestry practices.
	Continue the cooperative agreement with the Nebraska Forest Service (NSF) on the staff forester position.
Erosion prevention, control and sediment reduction	To develop a complete and comprehensive program for erosion control on crop land, stream banks, and range land from both water and wind, controlling sedimentation at the source being the most economical means for control and reduction.
	To carry on a continuing program of technical and financial assistance to farmers and ranchers for the application of basic soil and water conservation practices to be implemented in the following manner:

	<ul style="list-style-type: none"> • Continue the basic memorandum of understanding with the United States Department of Agriculture (USDA); • Continue the supplemental memorandum of understanding with the Natural Resources Conservation Service (NRCS8051S) to control erosion and sedimentation on agricultural land; • Work closely with the Farm Service Agency (FSA), Congress, and the State of Nebraska to maintain conservation cost-share assistance programs and strive to increase those funds both nationally and in Nebraska; and, • Provide local tax funds when available and practical to supplement Federal and State funded cost-share programs
	Provide the local leadership to administer the Erosion and Sediment Control Act as found in State Statues 2-4601 through 2-4613, RRS, Nebraska 1943.
	<p>Continue the program of assistance to counties and other governmental agencies for construction of flood control road structures on public highways until such time that the NRD feels that it has adequately demonstrated the economical benefit of such a program. The program to be implemented as follows:</p> <ul style="list-style-type: none"> • Provide assistance in a manner prescribed by the Board; • Request survey and design by the Natural Resources Conservation Service; • Strive to implement other programs district-wide; and, • Provide engineering assistance from sources other than NRCS, when necessary
	Provide assistance to cities and villages for urban subdivision development erosion problems.
	<p>Continue to support the soil survey program:</p> <ul style="list-style-type: none"> • Seek assistance from the NRCS to maintain the most up-to-date scientific soil survey data; and, • Make available and disseminate completed and published information
	Provide assistance to individuals and governmental entities on streambank erosion.
Range Management	<p>Continue to provide technical assistance on range management practices:</p> <ul style="list-style-type: none"> • Provide, through special initiations and grant programs, additional range management field staff to work with constituents.
	Continue to promote the conversion of crop land to grass on those land classifications that are less suitable for farming.
	Provide services for seeding when not available from private enterprise.
	Continue to promote planned grazing systems in cooperation with federal and state agencies.
	Continue to promote control of native and non-native invasive species through mechanical/chemical means, and/or controlled burns.
	Employ range specialist on the District level as the need develops.
Drainage improvement	Utilize the special projects sections of the NRD Law to assist local communities on drainage and channel rectification problems.

and channel rectification	Provide the necessary engineering and construction assistance to those communities with drainage and channel projects that will not have an adverse effect on the environment.
Development and management of fish and wildlife habitat	Provide adequate habitat for wildlife, including food, water, and shelter.
	Create wildlife buffers between urban and rural landscapes.
	Promote and provide assistance for the preservation, protection, and enhancement of wildlife habitat.
	Continue to provide funding for approved wildlife habitat programs.
	Continue to develop and provide public access for hunting, fishing, and outdoor activities.
	Develop the Davis Creek and Pibel Lake fisheries.
	Provide for and protect threatened and endangered species in the District.
	Provide fishery habitat, waterfowl habitat, and upland game bird habitat on District construction projects, whenever possible.
Carry on a continuing educational program to emphasize the need to protect all types of habitat.	
Development and management of recreational and park facilities	Provide recreational facilities on district projects when opportunities are presented.
	Provide recreational trails when opportunities are presented.
	Consider NRD sponsorship of recreational development in conjunction with federal and state projects.
	Provide for construction of multi-benefit projects, where recreation is combined with water storage, groundwater recharge, stream augmentation and other purposes.
	Provide financial and technical assistance to city and county government for park development.
Continue to offer and expand recreational opportunities at Davis Creek Reservoir, Pibel Lake Recreation Area, and Headquarters Arboretum.	
Solid waste recycling and disposal	Assist those responsible governmental agencies on establishment of sanitary landfills.
	Provide technical assistance on soils, water tables, and site selection.
	Provide technical assistance and engineering for on-site evaluation of erosion, sediment, flood control, and water quality monitoring.
	Provide information on solid waste issues and regulations to the public.
Promote and provide technical and financial assistance to communities for recycling programs.	

Additional completed and/or ongoing projects that support the NRDs goals to protect and maintain groundwater quantity and quality are discussed below.

Table 21: Recently Completed Projects

Project	Description
Annual Review and Update of Groundwater Management Plan	The LLNRD annually reviews and updates the Groundwater Management Plan to maintain consistency with local and state regulations.
Annual Groundwater Monitoring	The LLNRD collects groundwater measurements annually. The measurements are taken across the NRD to monitor the District's groundwater levels.

Clear Creek/Pibel Lake Survey	2014 survey of property owners and residents of the Clear Creek Watershed to develop a list of usable best management practices to improve water quality and conservation in the watershed.
South Loup River Watershed Plan	The 2017 plan was a comprehensive evaluation of the water resources in the watershed, both surface water and groundwater, as well as quality and quantity and how they are interrelated.
Airborne Electromagnetic (AEM) Survey	Study that involves flying a helicopter with a structure that maps the aquifer by sending electromagnetic pulses into the ground.
Annual Budget	The LLNRD budgets approximately \$1.5 million annually for water quantity projects.
Wellhead Protection Program	The LLNRD assists communities within the district with their Wellhead Protection Program by monitoring groundwater quality. The NRD tests domestic, irrigation, and stock wells for water quality.
Columbus Area Water Resources Assessment Study	The 2016 study of the area around the city of Columbus assessed the area's hydrology, groundwater, potential recharge projects, water budget, and development of a detailed groundwater model.

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.

Drought is a natural hazard which can impact a wide range of people and industries. Drought is not confined by borders or geological barriers. The National Drought Mitigation Center lists drought as the second most costly natural hazard, resulting in annual losses of nearly \$9 billion in the United States. Drought is a host to additional negative impacts, including economic losses; degradation of lands, corrosion of stream and river banks, population decline, increased stress on public mental health, heightened risk of wildfire and more severe flooding events. Many of these negative impacts are not only felt by communities in the throes of drought, but radiate into surrounding areas.

Although the NRD serves an estimated population of 68,746, the State of Nebraska's economic status is heavily influenced by the LLNRD region, with agricultural production in the area accounting for \$3,206,458,000 of the state's economy according to the 2012 US Census of Agriculture. Preparing for drought in the Lower Loup Basin will likely result in positive water supply effects on the downstream Lower Platte River Basin.

While there is no way to completely stop drought from impacting an area, by developing a Drought Management Plan the LLNRD is taking a proactive approach to address current vulnerabilities and mitigating the severity of future drought impacts on the region. The Drought Management Plan addresses these issues by: defining local drought thresholds allowing water providers to respond more quickly and effectively when drought conditions begin; identifying potential best management practices that could be promoted and/or implemented throughout the district; and developing a local drought monitoring and forecasting protocol to guide water users and providers clear direction of necessary actions prior to and during drought events. These plan components not only reduce the region’s economic and structural damage impacts, but also reduce negative social impacts by reducing stress and anxiety of water users during shortage periods.

Finally, protecting water resources through planning mechanisms have secondary impacts on the interaction to other hazards throughout the district. According to the LLNRD Hazard Mitigation Plan flooding and grass/wildfires occur on an annual basis. Periods of drought can exacerbate the impacts of these hazards by either reducing soil permeability for floodwater or depleting water supply to use in wildfire fighting.

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.

Funding for this Drought Management Plan will be split between the LLNRD budget and a Water Sustainability Fund grant request, with no other sources of funding for this project. The LLNRD has committed to 40% of the total project cost. A letter of financial commitment can be found in Appendix A. See table below for a project budget.

Table 22: Project Budget

Task	Total Cost
Project Management	\$10,000
Data Collection	\$8,250
Public and Stakeholder Engagement	\$25,250
Drought Management Plan	\$25,000
Recharge Projects	\$15,000
Drought Monitoring Protocol	\$3,600
Total	\$87,100

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.

Nebraska is comprised of 13 different river basins, all of which have profound impacts on the state's water quantity and quality. The LLNRD includes the Loup Basin watershed, but is bordered by five other watersheds. During the development of this Drought Management Plan, mitigation action projects and protocols will be established to assist the NRD in reducing impacts from future periods of drought. These components of the plan will protect overall watershed health and functionality by creating more sustainable water-flows. Through planning efforts to augment water quality and quantity, natural environments will be protected for wildlife and habitat, adding to the functionality of watersheds.

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 September 2017 State of Nebraska's "Annual Report and Plan of Work for the State Water Planning and Review Process" (https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/statewide/annual-report-to-legislature/2017/20170914_2017AnnualReportToLegislature.pdf) was used in the development of this project. The LLNRD district is included in the Lower Platte River Basin section of the report. The annual report's objectives will be considered throughout the development of the Drought Management Plan. The overall goal of the annual report and the Drought Management Plan are consistent: to protect and maintain water quality and quantity for water users. Objectives discussed in the plan are described below.

The objectives of the Annual Report that will be met by the project focus on the goals and objectives of the Integrated Management Plan. The development and implementation of the IMP is a significant part of the DNR's objectives for the Lower Platter River Basin. Consistent with the state's work plan, the IMP identifies the need to use best available science to monitor water supplies, develop and implement water use policies and practices that prioritize and contribute to the protection of existing surface and groundwater uses, and continue public education to encourage conservation and best management practices. These are consistent with the goals of the Drought Management Plan. Goals and objectives and specific strategies identified in the Drought Management Plan can be integrated into future updates of the IMP.

The state work plan also stresses the need for additional modeling and data collection efforts for the river basins. The Drought Management Plan supports these objectives by collecting and analyzing available data for drought occurrence, intensity, and impacts. This collected data will be provided for the NRD for future water management needs.

The state work plan addresses floodplain management. While the drought management plan does not directly impact floodplain mapping as discussed in the annual report, the potential to implement recharge sites does provide some value in floodplain management reducing peak flows during significant precipitation events and retiming the release of those water resources to be most beneficial to the District.

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.

National Response Framework:

The National Response Framework (3rd edition, 2016, <https://www.fema.gov/media-library/assets/documents/117791>) discusses goals to increase resiliency and response capability in the face of disaster. The Drought Management Plan will help the LLNRD meet these goals by allowing the district to respond more effectively and efficiently to periods of drought and times of diminished water quality. While the National Response Framework takes into account all types of natural and man-made disasters, the priorities emphasize saving lives, protecting property, protecting the environment, and ensuring resources are available. This plan complements each of these. The fundamental doctrine of the NRF includes: engaged partnerships; tiered response; scalable, flexible, and adaptable operational capabilities; unity of effort; and readiness to act.

Clean Water Act:

The Clean Water Act (1972) established a precedent for protecting the quality of water resources from pollution and degradation. The Drought Management Plan will also contribute to these goals of protecting the quality and quantity of water supplies. Section 401 requires that Federally permitted activities comply with the Clean Water Act standards, State water quality laws, and other laws as appropriate. This plan will include data sources and a protocol to assist the district in ensuring a sustainable water supply is available during periods of drought.

Endangered Species Act:

The Endangered Species Act (1973) emphasizes the need to protect critical wildlife species in areas with “esthetic, ecological, educational, recreational, and scientific value

to our Nation and its people.” The act is designed to protect, maintain, and/or recover ecosystems and populations of native species who are experiencing decline across the nation. The Drought Management Plan highlights the relationship between effective water management planning and its impact on natural ecosystems. Water quality and quantity management directly leads to improved ecosystems. There are multiple flora and fauna species throughout the district identified by the ESA, including but not limited to: Interior Least Tern, Piping Plover, Whooping Crane, River Otter, American Burying Beetle, Pallid Sturgeon, and Lake Sturgeon.

Section D.

PROJECT DESCRIPTION

1. Overview

In 1,000 characters or less, provide a brief description of your project including the nature and purpose of the project and objectives of the project.

Developing a Drought Management Plan creates more sustainable and effective water supply practices, benefiting water quality and quantity. The Lower Loup NRD will build a plan that defines drought in local terms by engaging citizens step-by-step. As part of the plan the NRD will establish a drought monitoring protocol, identify future mitigation projects, and include a drought tournament. A drought monitoring protocol and forecasting will be developed based on an analysis of historical drought events including duration, severity, and frequency. The project will include an assessment of areas that could be potential groundwater recharge and/or augmentation sites. Local, state, and federal plans will be assessed throughout the process to ensure the Plan complements and achieves applicable goals. A drought tournament will help identify current management protocols, gaps or vulnerabilities, and allow stakeholders to strengthen relationships across the District. Stakeholders include federal (USDA, USGS, etc.), state (NDNR, NEMA, NDOT, NDEQ, etc.) and local (elected officials, water system operators, emergency managers) agencies.

2. Project Tasks and Timeline

Identify what activities will be conducted by the project. For multiyear projects please list what activities are to be completed each year.

This project is expected to take approximately one year to complete. Estimated kickoff for the project is January 2019, with updates to the schedule made on an as-needed basis. Any adjustments required due to grant award will be reflected in the project schedule. Grant reporting will be ongoing throughout the project duration.

Task	Jan-19	Feb-19	Mar-19	Apr-19	May-19	June-19	July-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Project Management												
Data Collection												
Public and Stakeholder Engagement												

Drought Management Plan												
Recharge Projects												
Drought Monitoring Protocol												

3. Partnerships

Identify the roles and responsibilities of agencies and groups involved in the proposed project regardless of whether each is an additional funding source. List any other sources of funding that have been approached for project support and that have officially turned you down. Attach the rejection letter.

This Drought Management Plan is being led by the Lower Loup Natural Resources District. JEO Consulting Group, Inc. and HDR will provide support to the LLNRD as technical experts. Support in the planning process will be garnered through an active stakeholder engagement for communities, counties, and government agencies located within the region. A drought tournament will be held to bring these jurisdictions together. The drought tournament will present a hypothetical drought event, based on the historical record, and record responses by stakeholders. Potential stakeholders to attend the tournament include federal agencies (USDA, USGS, etc.), state agencies (NDEQ, NEMA, NDNR, NDOT, NDA, etc.) and communities (elected officials, water system operators, emergency managers, etc.). These jurisdictions will be responsible for providing input and describing current practices for water management. These responses are utilized by the NRD when developing the Drought Management Plan in order to build partnerships, make informed decisions, and better represent the District's water management needs.

4. Other Sources of Funding

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

The total cost of the project is \$87,100, with the LLNRD requesting a 60% grant from the Water Sustainability Fund. The NRD will provide the remaining 40% from local funds. A letter of financial commitment can be found in Appendix A and the following table shows the project budget. No other sources of funding are identified for this project. If the District were not to receive funding through the Water Sustainability Fund, the LLNRD will consider other funding alternatives, including local project funding or not beginning the project.

Task	Total Cost
Project Management	\$10,000
Data Collection	\$8,250
Public and Stakeholder Engagement	\$25,250
Drought Management Plan	\$25,000
Recharge Projects	\$15,000
Drought Monitoring Protocol	\$3,600
Total	\$87,100

5. Support/Opposition

Discuss both support and opposition to the project, including the group or interest each represents.

No opposition to the project has been demonstrated. The LLNRD will maintain transparency throughout the planning process with involved stakeholders, as well as taking all stakeholder positions into account when developing the Drought Management Plan. With the broad variety of stakeholders, including agricultural water users, industry, residents, and municipal water operators, water supply management can lead to confrontational discussions. By actively engaging each sector throughout the planning process, the LLNRD can ensure each sector is accurately represented and satisfied with the final plan.

Drought management planning receives strong support from local and regional emergency management. The Federal Emergency Management (Region VII), EPA, and USDA have all supported the use of drought management planning. More locally, the Nebraska Emergency Management Agency has supported drought planning and drought tournament efforts across the state.

Appendix A: Letter of Financial Commitment



2620 Airport Drive
Ord, Nebraska
68862-1002
(308) 728-3221
(308) 728-5669 FAX
llnrd.org

July 24, 2018

Nebraska Natural Resources Commission
301 Centennial Mall South
P.O. Box 94676
Lincoln, NE 68509-4676

RE: Water Sustainability Fund
Letter of Financial Commitment

Dear Commissioners, the Lower Loup Natural Resources District (LLNRD) is undertaking an effort to develop a Drought Management Plan for our service area. As the LLNRD provides groundwater management of portions of sixteen counties in central Nebraska, this planning process will refine a collective understanding of drought vulnerabilities, while developing monitoring and forecasting tools that will be linked to specific local triggers. The process will identify and prioritize mitigation efforts and define drought response measures that will be utilized during future drought events. The overarching goal is to develop a sound operational framework and improve critical water supplies throughout our District during periods of drought.

To illustrate our support for this planning project, the LLNRD hereby commits \$34,840 in cash towards the project.

If you should have any questions while reviewing it, please feel free to contact Tylr Naprstek, Assistant General Manager at tnaprstek@llnrd.org or (308) 728-3221. Thank you in advance for your consideration of our WSF Application.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Callan", written over a light blue horizontal line.

Russell Callan
General Manager

Appendix B: Letters of Support

Region 26 Council

Emergency Management & 911 Communications Center

PO Box B
402 4th Street
Taylor, NE 68879
(308) 942-3461 Fax (308) 942-9104
region26@region26.org

July 18, 2018

Natural Resources Commission
301 Centennial Mall South, 4th Floor
Lincoln, NE 68509-4676

Dear Chairman:

I'm writing this letter in support of the Drought Management Plan project being submitted for the NRC's Water Sustainability Fund by the Lower Loup Natural Resources District. The Lower Loup Natural Resources District has been working with local officials and emergency management partners to coordinate hazard mitigation planning and mitigation projects. Their partnership is vital to our Region 26 counties in their planning and mitigation efforts.

The Lower Loup Natural Resources District's project will be critical in identifying additional drought mitigation efforts and improving preparedness through effective drought planning.

I fully support the efforts of the Lower Loup Natural Resources District as they seek external funding to support a project designed to improve drought planning and preparedness in our Region 26 Emergency Management area including Loup, Garfield, Wheeler, Greeley, Valley and Sherman Counties.

Sincerely,



Alma Beland, Director
REGION 26 COUNCIL

Dear Nebraska Natural Resources Commission (NRC) Chairman:

This letter is being written in support of the Drought Management Plan project being submitted for the NRC's Water Sustainability Fund by the Lower Loup Natural Resources District.

Lower Loup Natural Resources District has been working with local officials and emergency management partners to coordinate hazard mitigation planning and mitigation projects. Their partnership is vital to Howard County planning and mitigation efforts.

The Lower Loup Natural Resources District's project will be critical in identifying additional drought mitigation efforts and improving preparedness through effective drought planning.

In conclusion, Howard County fully support the efforts of the Lower Loup Natural Resources District as they seek external funding to support a project designed to improve drought planning and preparedness in the County.

Sincerely,

Michelle Woitalewicz

Michelle Woitalewicz
Howard County Emergency Manager
612 Indian Street, Suite 13
St. Paul, Ne. 68873