NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

NOTE: See Attachment A for a list of acronyms used throughout this application.

PROJECT NAME: City of Blair Water Supply Resiliency Project

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

Sponsor Business Name: **City of Blair, Nebraska**

Sponsor Contact's Name: **Allen Schoemaker, Director of Public Works**

Sponsor Contact's Address: **218 South 16th Street, Blair, NE 68008**

Sponsor Contact's Phone: **402-426-4191**

Sponsor Contact's Email: **ARS@blairnebraska.org**

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

   Grant amount requested. **$6,006,000**

   - If requesting less than 60% cost share, what %? **42%**

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

   - How many years repayment period? **N/A**
   - Supply a complete year-by-year repayment schedule. **N/A**

2. **Neb. Rev. Stat. § 2-1507 (2)**

   Are you applying for a **combined sewer overflow project**? YES☐ **NO**☒

If yes:

- Do you have a Long-Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality? YES☐ NO☐
- Attach a copy to your application. **N/A**
- What is the population served by your project? **N/A**
- Provide a demonstration of need. **N/A**
- **Do not complete the remainder of the application.**

3. **Permits Required/Obtained** Attach a copy of each that has been obtained. For those needed, but not yet obtained (box **"NO"** checked), 1.) State when you will apply for the permit, 2.) When you anticipate receiving the permit, and 3.) Your estimated cost to obtain the permit.

(N/A = Not applicable/not asking for cost share to obtain)
(Yes = See attached)
(No = Might need, don't have & are asking for 60% cost share to obtain)

G&P - T&E consultation (required)	N/A☒	Obtained: YES☐	NO☐
DNR Surface Water Right	N/A☒	Obtained: YES☐	NO☐
USACE (e.g., 404/other Permit)	N/A☐	Obtained: YES☐	NO☒
FEMA (CLOMR)	N/A☒	Obtained: YES☐	NO☐
Local Zoning/Construction	N/A☒	Obtained: YES☐	NO☐
Cultural Resources Evaluation	N/A☒	Obtained: YES☐	NO☐
Other (provide explanation below)	N/A☐	Obtained: YES☐	NO☒

The permits that will be required for this project included a 401, 404, and a 408 permit from the US Army Corps of Engineers (USACE), clearance from the Coast Guard, and a NPDES general permit. The current plan is to share project details with permitting agencies when the 65% level design plans are complete in August of 2019. The various agency comments will be addressed as the design moves into the final stage, which will be completed in March 2020. The permitting costs that will remain after commission approval are estimated to be approximately $100,000.

4. **Partnerships**

List each Partner / Co-sponsor, attach documentation of agreement:
None

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

5. **Other Sources of Funding**

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

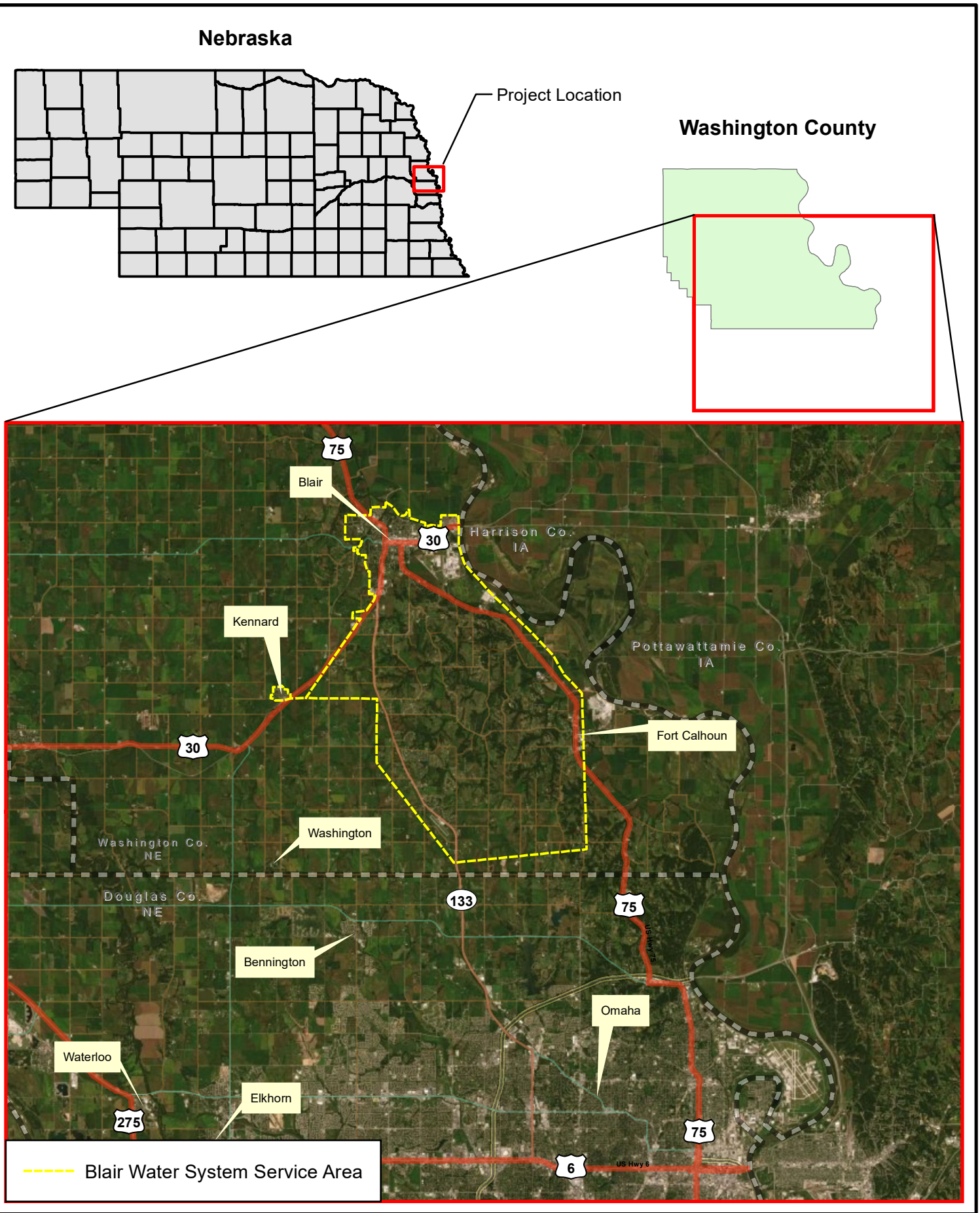
6. **Overview**

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

The City of Blair (City) provides drinking water to residential, industrial and commercial customers in and around Blair, Nebraska (Figure 1, Blair Water System service area map). The City owns and operates the entire municipal water system including a 20 million gallon per day (MGD) water treatment plant that draws from the Missouri River. Currently, the City supplies 1-4 million gallons per day (MGD) to its 8,000 residential and rural water customers, 10-15 MGD to the Cargill biocampus, a large industrial user and regional employer, and about 2 MGD to other commercial and industrial customers. The City has an interconnection with Omaha's Metropolitan Utilities District (MUD) through a rural water system that can draw 1 MGD from the interconnection in case of emergency.

The City is concerned about the resiliency of the water system during both flood and drought conditions. The City experienced extreme flood events in 2011 and again this March that caused significant damage to the utility and surrounding area. Flood mitigation measures have been implemented but now the threat of drought is of critical concern to the sustainability of the system.

The Missouri River basin is controlled by the USACE and as part of the Annual Operating Plan, the USACE notified water users on this portion of the Missouri River to prepare for a future 9,000 cubic feet per second (cfs) release from an upstream dam. With a flow of 9,000 cfs in the Missouri River, Blair's water supply intake would be high and dry. A river flow below 13,000 cfs is the typical annual



olsson

N

0 5,000 10,000 20,000

1 " = 20,833 '
Original Published Resolution
WGS 1984 ARC System Zone 11
ESRI USA Topographic Map

Blair Water System Service Area
Blair, Nebraska

FIGURE
1

low flow in the river and a flow of 12,000 cfs is the minimum level for the existing water supply intakes. Below the 12,000 cfs, the City can no longer meet its full water demand.

In the event of the USACE planned low flow conditions, Blair's connection to MUD could supply up to 1 MDG for the residential customers. The emergency supply will be able to supply the water necessary to sustain its residents, but the supply is over ten times less than what is needed to supply the industrial and commercial users. Cutting the water supply to the Cargill biocampus would be a significant impact to the economy of the area since Cargill and the consortium of biocampus companies are the largest employer in the area. Furthermore, conservation by residents would only go so far since the industrial demand is so much higher. For Cargill, their monthly water bill is over $500,000 and they already employ water conservation measures to mitigate for this expense.

For this reason, the City has been working to address the vulnerability to their water supply. The City considered numerous adaptive measures to reduce the consequences of the drought threat including installing intake pumps that can be raised and lowered, deploying pumps on barges, and installing wellfields or collector wells that draw from the alluvial aquifer. Each option has varying cost effectiveness and permitting requirements. The least cost alternative, considering the permitting and operational requirements of the top three alternatives, is to build a lower intake that can pull water from lower in the river and continue to supply 20 MGD.

Blair's Water Supply Resiliency Project will provide a direct benefit to all water users in Blair by allowing the City to withdraw water from the Missouri during low flow conditions. This will minimize the impact to groundwater aquifers in the area and allow the USACE to operate the Missouri River with the flexibility it needs to manage flows in both flood and drought conditions.

7. Project Tasks and Timeline

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

Tasks	Year 1$	Year 2$	Year 3$	Remaining	Total $ Amt.
Permits	$18,000				$18,000
Engineering		$96,000			$96,000
Construction		$87,000	$96,000		$183,000
Close-out				$8,000	$8,000
				TOTAL	$305,000

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

Tasks	Year 1$	Year 2$	Total $ Amt.
Permitting and Design	$ 298,927		$ 298,927
Construction	$7,601,560	$6,399,513	$14,001,073
		TOTAL	$14,300,000

8. **IMP**

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

Section B.

DNR DIRECTOR'S FINDINGS

NOTE: See Attachment A for a list of acronyms used throughout this application.

Prove Engineering & Technical Feasibility

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

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

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

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

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

Attachment B contains a report titled City of Blair Water Source Study which was completed for the City of Blair by Burns & McDonnell and dated Feb. 5, 2016.

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

Currently, the City of Blair's (City) water supply is accessed through an intake structure on the Missouri River and flow in the Missouri River is controlled by the US Army Corps of Engineers (USACE). In 2012, the USACE informed water users along the Missouri River downstream of Gavin's Point Dam that in the future, flows in the Missouri River may be significantly reduced due to drought conditions. The proposed change was followed up in 2013 with written correspondence from the USACE to the City. The USACE informed the City that they needed to prepare for a future where water would potentially be released at a rate of only 9,000 cubic feet per second (cfs) from Gavins Point. News of this operational change posed a significant threat to the City's water supply.

Following this, the City had a consultant evaluate the amount of water that would be available through the City's current intake structure for a series of low flow scenarios in the Missouri River. Attachment C is a technical memorandum provided to the City by HDR Engineering, Inc. on July 30, 2013. Table 1 summarizes the amount of water that the city could pump into their water treatment plant under certain flow conditions in the Missouri River at the location of their treatment plant.

Table 1 Missouri River Discharge and Production Estimates (HDR 2013)

Flow in the Missouri River at Blair (CFS)	Approximate Production Ability (MGD)
16,000	20
14,000	17.5
12,800	15-16
12,000	7-8
11,400	Less than 3
11,000	Zero
9,000	Zero

So, flows below 14,000 cfs begin to limit the City's ability to provide water to its users, and when flows drop below 11,000 cfs, the City's current river intake in unable to provide any water to its users. Currently, the City supplies 1-4 million gallons per day (MGD) to its 8,000 residential and rural water customers, 10-15 MGD to the Cargill biocampus, a large industrial user and regional employer, and about 2 MGD to other commercial and industrial customers. Cargill is the largest employer in the area where it has built and operates the world's largest wet corn milling facility. Blair's water system is connected to Omaha's Metropolitan Utilities District (MUD) with a pipe that can supply up to 1 million gallons per day for the 8,000 residential customers. The emergency supply would be able to supply the water necessary to sustain its residents, but the supply is significantly less than what is needed to supply the industrial and commercial users

Next, the City contracted with Burns & McDonnell to study the City's options for maintaining its current ability to provide up to 20 MGD to its customers under potential low flow conditions. Attachment B contains their report titled City of Blair Water Source Study which was completed for the City by Burns & McDonnell and dated Feb. 5, 2016. The report documents the pros and cons of a number of alternatives, including an opinion of probably cost for each alternative. The alternatives are grouped into five categories below:

1) Supplementary river pumping options
2) Expansion of existing intake
3) New intake structure
4) Passive wedge screens
5) Alluvial vertical or horizontal wells

The alternative with the lowest initial cost were the supplementary pumping options such as barge mounted pumps. However, after careful evaluation it was determined that this type of approach brought too many risks and could not be considered a long-term solution to the City's problem. Expansion of the existing intake was found to cost as much as or more than the option of building a new intake structure (initial cost estimate of $15,050,000). The last two potential options were also found to be more costly than the option of constructing a new intake structure and were also fraught with

other potential issues or concerns. Therefore, the City began preparations to construct a new, lower intake structure that would be capable of providing the same supply as the current intake structure but at much lower levels of Missouri River flow.

The City retained Burns & McDonnell to complete the design phase of the project, and in March of 2019 they issued 30% design plans (Attachment D). A geotechnical site evaluation was completed by Terracon and is documented in their report dated March 6, 2019 (Attachment E). The City expects to receive 65% design plans, which should include mechanical, structural, electrical, and site civil designs, in August of 2019. Following that the 100% design plans will be completed in March of 2020, the project bid out by May of 2020, construction between August 2020 and October 2021, with the new intake coming online in November of 2021.

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

Attachment E is the geotechnical report completed as part of the design process.

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

See Attachment C Blair Intake River Gage Analysis and Attachment F Blair Intake Bathymetric Map.

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

The permits that will be required for this project included a 401, 404, and a 408 permit from the USACE clearance from the Coast Guard, and a NPDES general permit. The current plan is to share project details with permitting agencies when the 65% level design plans are complete. The various agency comments will be addressed as the design moves into the final stage.

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

The new intake will be located immediately upstream of the existing intake. The piping between the two intakes will be interconnected to provide redundancy.

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

See Attachment E for the geotechnical evaluation completed for the project.

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

Attachment C contains the hydrologic investigation that was completed to determine the necessity for the project and the specifications for the intake elevation.

1.A.9 When applicable include the criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3).

See Attachment E for the geotechnical evaluation completed for the project. This information was obtained in order to complete final design of the project.

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

1.B.1 Insert data necessary to establish technical feasibility (004.02); **N/A**

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

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

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

1.B.5 Discuss the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D). **N/A**

Prove Economic Feasibility

(Applicant must demonstrate compliance with Title 261, CH 2 - 005)

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

The City contracted with Burns & McDonnell to study the City's options for maintaining its current ability to provide up to 20 MDG to its customers under potential low flow conditions. Attachment B contains their report titled City of Blair Water Source Study which was completed for the City by Burns & McDonnell and dated Feb. 5, 2016. The report documents the pros and cons of a number of alternatives, including an opinion of probably cost for each alternative. The alternatives are grouped into five categories below.

1) Supplementary river pumping options
2) Expansion of existing intake
3) New intake structure
4) Passive wedge screens
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The alternative with the lowest initial cost were the supplementary pumping options such as barge mounted pumps. However, after careful evaluation it was determined that this type of approach brought too many risks and could not be considered a long-term solution to the City's problem. Expansion of the existing intake was found to cost as much as or more than the option of building a new intake structure (initial cost estimate of $15,050,000). The last two potential options were also found to be more costly than the option of constructing a new intake structure and were also fraught with other potential issues or concerns.

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

A detailed description of the project costs of construction and the timeline for completion of each element the construction is presented in Attachment G. Annual O&M is estimated to average $40,000 per year for the 50-year life of the project. With annual Operation and Maintenance (O&M) the project is expected to cost $16,260,000.

The benefits associated with the project are a water supply for a significant socioeconomic area of Nebraska that will be sustainable through prolonged and severe drought. The City has completed an evaluation of their production ability of water at different Missouri River flow rates (Table 1).

Table 1 Missouri River Discharge and Production Estimates (HDR 2013)

Flow in the Missouri River at Blair (CFS)	Approximate Production Ability (MGD)
16,000	20
14,000	17.5
12,800	15-16
12,000	7-8
11,400	Less than 3
11,000	Zero
9,000	Zero

Without the project, when releases from the upstream reservoirs into the Missouri River are reduced below 16,000 cfs, the City's ability to pull water out of the river becomes impaired. At the 9,000 cfs rate that the City has been warned to prepare for by the USACE the city will have no production capacity and will be unable to independently supply water to its water users. While they do have an emergency back-up supply from

the MUD, that can only supply up to 1 million gallons per day, an amount far short of current existing demand.

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

A detailed description of the project costs of construction and the timeline for completion of each element of the construction is presented in Attachment G. Annual O&M is estimated to average $40,000 per year for the 50-year life of the project. With annual O&M the project is expected to cost $16,260,000 over 50 years.

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

In 2014, the City hired a consultant to perform a feasibility study to evaluate the options to mitigate against low river flows due to reduced releases from upstream reservoirs (Burns & McDonnell 2016, Attachment B). The study, called the Water Source Study, was produced collaboratively with the City, Cargill, and the consulting engineers. The study considered seven specific options that could be implemented to provide a reliable water source in times of drought and/or low flow conditions in the Missouri River. The options evaluated included:

1. Barge mounted pumps
2. Shallow alluvial wells
3. Radial collector wells
4. Expansion of the existing intake for low river levels
5. Passive wedge wire screen system in the river
6. Rail-mounted supplemental pumps
7. New, lower, intake structure

Each option was evaluated based on the following criteria:

- Ability to provide the needed quality and quantity of water
- Long-term reliability
- Challenges of the system (operational and permitting)
- Cost to develop and implement

According to the study, the only option without significant permitting, operational, cost, or constructability challenges is the option to construct a new, lower intake (Table 2).

Table 2 Evaluation Matrix for Blair's Drought Resiliency Options

	Evaluation Criteria			
Option Description	**Meets Demand**	**Reliability**	**Challenges**	**Estimated Cost**
Barge-mounted pumps	Yes	Low	Significant	$750,000
Shallow alluvial wells	Yes	High	Moderate	$45,000,000
Radial collector well	Yes	High	Moderate	$40,000,000
Expansion of existing intake	Yes	High	Significant	$20,000,000
Rail-mounted pumps	Yes	Low	Moderate	$1,000,000
Passive wedge wire screens	Yes	Moderate	Significant	$15,000,000
New, lower intake structure	Yes	High	Minimal	$15,050,000

Green = good option, yellow = moderate risk of failure, red = significant threat to project or high cost

The pros and cons for each option are documented in the report and the key factors are summarized here:

1. Barge mounted pumps
    - Potential ice damage to barges during winter reducing reliability of this option
    - Difficulty finding contractor and crew to install, maintain, and remove barges
    - Cost, scheduling and permitting issues with regard to having barges on hand when needed
    - Barge contractors and crews not readily available in Omaha due to lack of barge traffic on the Missouri River
2. Shallow alluvial wells
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Forty-four wells spaced across a large area would be required to meet the water demand
    - Significant land acquisition required for well field
    - Significant amount of piping would be required to supply water to the (Water Treatment Plant (WTP)
    - Groundwater constituents and elevated hardness may require changes to the WTP
    - Significant cost associated with this option
3. Radial collector well
    - An extensive hydrogeologic investigation would be required to verify hydraulic connection between the river and the aquifer
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Significant amount of piping would be required to supply water to WTP, especially if only the east side of the river could accommodate a radial well
    - Groundwater constituents and elevated hardness may require changes to the WTP
    - Significant cost associated with this option

4. Expansion of the existing intake for low river levels
    - Cost is as high or higher than constructing a new intake structure
    - Significant sheeting and shoring required for construction
    - Risk of significant turbidity increase in municipal supply during construction
    - Increased risk from construction interrupting water supply
5. Rail Mounted Supplementary Pumps
    - Current users remove and re-install pumps which is an interruption in service
    - Full structural evaluation of existing intake would be required to prove a rail system addition would not compromise structural integrity of current intake
    - High operation and maintenance cost
6. Passive wedge wire screen system in the river
    - Minimal clearance of screen during periods of low river flow
    - Minimal clearance may cause issues with ice on river during winter months
    - Minimal clearance may pose permitting issues with US Coast Guard
    - River debris can pose a threat to the intake screens
    - Additional permitting with US Coast Guard would be required
    - Significant operational and maintenance costs including the cost of divers for required screen maintenance
7. New, lower intake structure
    - Although the new lower intake is not the lowest cost alternative, it provides redundancy in water supply that will allow for maintenance of existing intake
    - Provides for future expansion to 20 MGD
    - The new intake is higher cost than both the rail-mounted and barge mounted supplemental pumps but does not have the operational issues or interruptions in service
    - Uses existing electrical building for control components and pumps
    - Will not require changes to the WTP because water chemistry is the same

Given the significant level of constraints for most of the options, the only other realistic alternative would be to develop a groundwater source for the City. Regardless of the type of wells used in a new groundwater source, the cost would be approximately three times the cost of a new intake structure. Therefore, the new intake structure is the least cost alternative for the city to develop a reliable water supply during drought conditions.

3.C Present all cost and benefit data in a table to indicate the annual cash flow for the life of the project (005.03).

An attached table (Attachment H) presents the annual cash flow for the fifty-year life of the project. The annual cash flow table includes a comparison of this cash flow to the anticipated cash flow required to complete the next best alternative, a groundwater wellfield in the vicinity of the City. Over the 50-year period, including operation and maintenance costs, the new water intake is the least cost option by $25,700,000.

3.D In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water

sustainability, demonstrate the economic feasibility of such proposal by such method as the Director and the Commission deem appropriate (005.04). (For example, show costs of and describe the next best alternative.)

In 2014, the City hired a consultant to perform a feasibility study to evaluate the options to mitigate against low river flows due to reduced releases from upstream reservoirs (Burns & McDonnell 2016, Attachment B). The study, called the Water Source Study, was produced collaboratively with the City, Cargill, and the consulting engineers. The study considered seven specific options that could be implemented to provide a reliable water source in times of drought and/or low flow conditions in the Missouri River. The options evaluated included:

1. Barge mounted pumps
2. Shallow alluvial wells
3. Radial collector wells
4. Expansion of the existing intake for low river levels
5. Passive wedge wire screen system in the river
6. Rail-mounted supplemental pumps
7. New, lower, intake structure

Each option was evaluated based on the following criteria:

- Ability to provide the needed quality and quantity of water
- Long-term reliability
- Challenges of the system (operational and permitting)
- Cost to develop and implement

According to the study, the only option without significant permitting, operational, cost, or constructability challenges is the option to construct a new, lower intake (Table 2).

Table 2 Evaluation Matrix for Blair's Drought Resiliency Options

	Evaluation Criteria			
Option Description	**Meets Demand**	**Reliability**	**Challenges**	**Estimated Cost**
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Expansion of existing intake	Yes	High	Significant	$20,000,000
Rail-mounted pumps	Yes	Low	Moderate	$1,000,000
Passive wedge wire screens	Yes	Moderate	Significant	$15,000,000
New, lower intake structure	Yes	High	Minimal	$15,050,000

Green = good option, yellow = moderate risk of failure, red = significant threat to project or high cost

The pros and cons for each option are documented in the report and the key factors are summarized as follows:

1. Barge mounted pumps
    - Potential ice damage to barges during winter reducing reliability of this option
    - Difficulty finding contractor and crew to install, maintain, and remove barges
    - Cost, scheduling and permitting issues with regard to having barges on hand when needed
    - Barge contractors and crews not readily available in Omaha due to lack of barge traffic on the Missouri River
2. Shallow alluvial wells
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Forty-four wells spaced across a large area would be required to meet the water demand
    - Significant land acquisition required for well field
    - Significant amount of piping would be required to supply water to the WTP
    - Groundwater constituents and elevated hardness may require changes to the WTP
    - Significant cost associated with this option
3. Radial collector well
    - An extensive hydrogeologic investigation would be required to verify hydraulic connection between the river and the aquifer
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Significant amount of piping would be required to supply water to WTP, especially if only the east side of the river could accommodate a radial well
    - Groundwater constituents and elevated hardness may require changes to the WTP
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4. Expansion of the existing intake for low river levels
    - Cost is as high or higher than constructing a new intake structure
    - Significant sheeting and shoring required for construction
    - Risk of significant turbidity increase in municipal supply during construction
    - Increased risk from construction interrupting water supply
5. Rail Mounted Supplementary Pumps
    - Current users remove and re-install pumps which is an interruption in service
    - Full structural evaluation of existing intake would be required to prove a rail system addition would not compromise structural integrity of current intake
    - High operation and maintenance cost
6. Passive wedge wire screen system in the river
    - Minimal clearance of screen during periods of low river flow
    - Minimal clearance may cause issues with ice on river during winter months
    - Minimal clearance may pose permitting issues with US Coast Guard
    - River debris can pose a threat to the intake screens
    - Additional permitting with US Coast Guard would be required
    - Significant operational and maintenance costs including the cost of divers for required screen maintenance

7. New, lower intake structure
    - Although the new lower intake is not the lowest cost alternative, it provides redundancy in water supply that will allow for maintenance of existing intake
    - Provides for future expansion to 20 MGD
    - The new intake is higher cost than both the rail-mounted and barge mounted supplemental pumps but does not have the operational issues or interruptions in service
    - Uses existing electrical building for control components and pumps
    - Will not require changes to the WTP because water chemistry is the same

Given the significant level of constraints for most of the options, the only other realistic alternative would be to develop a groundwater source for the City. Regardless of the type of wells used in a new groundwater source, the cost would approximately three times the cost of a new intake structure. Therefore, the new intake structure is the least cost alternative for the city to develop a reliable water supply during drought conditions.

Prove Financial Feasibility

(Applicant must demonstrate compliance with Title 261, CH 2 - 006)

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

The Blair City Council reviews the necessary rates to be charged to cover capital and operations and maintenance costs for the water system on an annual basis. The council can implement changes to the rates charged or consider bonding certain costs of providing water service. Cited below is the state statute that allows the city to issue bonds and set rates for providing water services.

Authority to Issue Bonds - Neb. Rev. Stat. § 16-693

When any bonds shall have been issued by the city for the purpose of constructing or aiding in the construction of a system of waterworks, power plant, sewerage, heating, lighting or drainage, there shall thereafter be levied annually upon all taxable property of said city a tax not exceeding seven cents on each one hundred dollars for every twenty thousand dollars of bonds so issued, which shall be known as the waterworks tax, power tax, sewerage tax, heat tax, light tax or drainage tax, as the case may be, and shall be payable only in money. The proceeds of such tax, together with all income received by the city from the payment and collection of water, power, heat or light, rent, taxes, and rates of assessments, shall first be applied to the payment of the current expenses of waterworks, power plant, heating or lighting, to improvements, extensions, and additions thereto, and interest on money borrowed and bonds issued for their construction. The surplus, if any, shall be retained for a sinking fund for the payment of such loan or bonds at maturity.

Rate Making Authority - Neb. Rev. Stat. § 16-679

The mayor and council shall have power to require every individual or private corporation operating such works or plants, subject to reasonable rules and regulations, to furnish any person applying therefor, along the line of its pipes, mains, wires or other conduits, with gas, water, power, light or heat, and to supply said city with water for fire protection, and with gas, water, power, light or heat, for other necessary public or private purposes; to regulate and fix the rents or rates of water, power, gas, electric light or heat; and to regulate and fix the charges for water meters, power meters, gas meters, electric light or heat meters, or other device or means necessary for determining the consumption of water, power, gas, electric light or heat. These powers shall not be abridged by ordinance, resolution or contract.

Neb. Rev. Stat. § 16-681

Such city owning, operating or maintaining its own gas, water, power, light or heat system, shall furnish any person applying therefor, along the line of its pipes, mains, wires or other conduits, subject to reasonable rules and regulations, with gas, water, power, light or heat. It shall regulate and fix the rental or rate for gas, water, power, light or heat, and regulate and fix the charges for water meters, power meters, gas meters, light meters or heat meters or other device or means necessary for determining the consumption of gas, water, power, light or heat. It shall require water meters, gas meters, light meters, power meters, or heat meters to be used, or other device or means necessary for determining the consumption of gas, water, power, light or heat.

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

The Blair City Council reviews the necessary rates to be charged to cover capital and operations and maintenance costs for the water system on an annual basis. The council can implement changes to the rates charged or consider bonding certain costs of providing water service. Cited below is the state statute that allows the city to issue bonds and set rates for providing water services.

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expenses of waterworks, power plant, heating or lighting, to improvements, extensions, and additions thereto, and interest on money borrowed and bonds issued for their construction. The surplus, if any, shall be retained for a sinking fund for the payment of such loan or bonds at maturity.

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

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

By avoiding the need to utilize a barge-mounted pump or pumps, the encroachment on the riverine habitat of the Missouri River will be minimized.

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

The City of Blair / Blair Public Works Department has the authority to operate a water system as per the Nebraska Department of Health and Human Services, Water System Number NE3117905. Blair has the authority to set applicable water use rates to satisfy

the cost of operating a water system. Blair has the right to issue revenue bonds and to recover these costs through water use rates.

Authority to Issue Bonds - Neb. Rev. Stat. § 16-693

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Rate Making Authority - Neb. Rev. Stat. § 16-679

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

There are two specific plans that this project will address. The first is the Papio-Missouri River Natural Resources District's (NRD) Integrated Management Plan or IMP. The IMP was jointly developed by the Nebraska Department of Natural Resources (NDNR) and the NRD and it was adopted on August 31, 2014. Since adoption of their IMP the Papio-Missouri River NRD has submitted annual reports to NDNR reporting progress toward reaching the goals and objectives of the plan. Additionally, this project will support the goals and objectives of the Papio-Missouri River NRD's revised Groundwater Management Plan (GMP) adopted in 2016. A letter in support of Blair's Water Supply Resiliency Project from the Papio-Missouri River NRD is included as Attachment I. The specific goals and objectives that this project will support are as follows:

IMP Goal 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Objective 1.1 - Utilize existing policies and authorities of Papio-Missouri River NRD and NDNR to address water quantity issues.

Objective 1.3 – Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

GMP Water Sustainability Goal

Water use is sustainable when it promotes healthy watersheds and aquifers, improves water quality, protects water supplies through best management practices, and manages surface and groundwater resources conjunctively to protect the ability of future generations to meet their needs.

This project helps meet the IMPs first goal and objectives by allowing the City to use the Missouri River as its primary source of water instead of wells that would increase pressure on the groundwater resources in the area. The City currently withdraws approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across an extensive wellfield (Attachment B). Installation of such a large wellfield would significantly reduce the capacity of future groundwater development in the area. There are over 250 wells currently registered with NDNR within a 3-mile radius of Blair. By constructing this new lower intake structure, these existing groundwater uses are protected from impacts of a new wellfield.

This project is an example of how a community is helping the NRD meeting its GMP water sustainability goal. As described in the previous paragraph, the project allows the City to use the Missouri River as it source of water (instead of groundwater) and therefore it is managing surface and groundwater resources to protect the ability of future generations to meet their water needs. Furthermore, by installing the new lower

intake, the USACE will be able to regulate flow in the Missouri to maintain flows that promote a healthy watershed. The USACE manages the Missouri River to meet the goals of many users including agriculture, barge navigation, hydropower, flood reduction, recreational and fish and wildlife needs. The USACE needs this flexibility in their management of flows in the Missouri River to ensure that the needs of all these water users are met sustainably.

10. Are land rights necessary to complete your project? **YES**☒ NO☐

If yes:

10.A Provide a complete listing of all lands involved in the project.

Parcel	Area in Acres
890041335	137.25
890041356	641.93
890041440	641.23
890041769	36.72

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

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

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

The City of Blair / Blair Public Works Department has the authority and obligation to provide its citizens with basic drinking water and sanitation services. This includes the development and operation of the public water supply and wastewater system. The Blair Public Works Department has the authority to operate a water system as per the Nebraska Department of Health and Human Services, water system number NE3117905. Blair has the right to issue bonds and to recover these costs through water use rates.

Rate Making Authority - Neb. Rev. Stat. § 16-679

The mayor and council shall have power to require every individual or private corporation operating such works or plants, subject to reasonable rules and regulations, to furnish any person applying therefor, along the line of its pipes, mains, wires or other conduits, with gas, water, power, light or heat, and to supply said city with water for fire protection, and with gas, water, power, light or heat, for other necessary public or private purposes; to regulate and fix the rents or rates of water, power, gas, electric light or heat; and to regulate and fix the charges for water meters, power meters, gas meters,

electric light or heat meters, or other device or means necessary for determining the consumption of water, power, gas, electric light or heat. These powers shall not be abridged by ordinance, resolution or contract**.**

Neb. Rev. Stat. § 16-681

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

No negative environmental or ecological consequences are anticipated to occur as a result of this project.

Section C.

NRC SCORING

NOTE: See Attachment A for a list of acronyms used throughout this application.

In the NRC's scoring process, points will be given to each project in ranking the projects, with the total number of points determining the final project ranking list.

The following 15 criteria constitute the items for which points will be assigned. Point assignments will be 0, 2, 4, or 6 for items 1 through 8; and 0, 1, 2, or 3 for items 9 through 15. Two additional points will be awarded to projects which address issues determined by the NRC to be the result of a federal mandate.

Notes:

- The responses to one criterion *will not* be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.

- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted above. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.

- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

Complete any of the following (15) criteria which apply to your project. Your response will be reviewed and scored by the NRC. Place an N/A (not applicable) in any that do not apply, an N/A will automatically be placed in any response fields left blank.

1. Remediates or mitigates threats to drinking water;

   - Describe the specific threats to drinking water the project will address.
   - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
   - Provide a history of issues and tried solutions.
   - Provide detail regarding long-range impacts if issues are not resolved.

Currently, the City of Blair's (City) water supply is accessed through an intake structure on the Missouri River and flow in the Missouri River is controlled by the US Army Corps

of Engineers (USACE) (Figures 2 and 3). In 2012, the USACE informed water users along the Missouri River downstream of Gavin's Point Dam that in the future, flows in the Missouri River may be significantly reduced due to drought conditions. The proposed change was followed up in 2013 with written correspondence from the USACE to the City. The USACE informed the City that they needed to prepare for a future where water would potentially be released at a rate of only 9,000 cubic feet per second (cfs) from Gavins Point. News of this operational change posed a significant threat to the City's water supply.

Figure 2 The Blair's water intake pump house on the Missouri River looking downstream toward the Mormon Bridge.

Figure 3 The Blair's water intake pump house on the Missouri River looking upstream.

Currently, the City supplies 1-4 million gallons per day (MGD) to its 8,000 residential and rural water customers, 10-15 MGD to the Cargill biocampus, a large industrial user and regional employer, and about 2 MGD to other commercial and industrial customers. Cargill is the largest employer in the area where it has built and operates the world's largest wet corn milling facility. Blair's water system is connected to Omaha's Metropolitan Utilities District (MUD) with a pipe that can supply up to 1 million gallons per day for the 8,000 residential customers. The emergency supply would be able to supply the water necessary to sustain its residents, but the supply is significantly less than what is needed to supply the industrial and commercial users.

When the USACE stated that they could drop the discharge from Gavins Point Dam to 9,000 cfs with minimal notice, the City realized they needed to act. The City hired a consultant to perform a hydraulics analysis to assess the impact to the water supply. The analysis included developing a stage discharge relationship or rating curve using the flow and stage data from the USGS gages along the Missouri River. The rating curve was used to predict the low flow water surface elevation at the Water Treatment Plant and the water production capability.

As shown in the study, with a flow of 9,000 cfs in the Missouri River, Blair's water supply intake would not be able to access water from the intake. A river flow of 13,000 cfs is the typical annual low flow in the river and a flow of 12,000 cfs is the minimum level for the existing water supply intakes. Below the 12,000 cfs, the City can no longer access the Missouri River and therefore, it would not meet the needs of the residential, commercial and industrial water users in low flow conditions. Two remedial options were briefly presented in the report, but the City needed to evaluate all available options in order to identify the least cost alternative.

In 2014, the City hired a second consultant to perform a feasibility study to evaluate the options to mitigate the drought impacts (Burns & McDonnell 2016, Attachment B). Based on the results of the Source Water Study, the City decided to move forward with the new, lower intake structure. As proposed, the new intake structure will be located immediately upstream of the existing intake. The piping between the two intakes will be interconnected to provide redundancy as well as an opportunity to expand water supply in the future. The existing intake is rated for 20 MGD and the new intake will also provide 20 MGD. Current water rights allow the City to remove 20 MGD but could be altered to increase their total volume to 40 MGD during normal flows on the Missouri River. The additional volume of water harvested from the Missouri River represents an increase of 100% over existing conditions. The additional water will provide the City the opportunity to sell additional water to Cargill and thus continue the positive economic growth that is occurring in Blair. During times of drought or low flow conditions, the total volume of water that could be removed is 20 MGD. The new intake will allow the City to meet the 1-4 MGD demand of the city residents as well as provide water to the Cargill biocampus and the City's growing industrial base.

If this project is not constructed and a severe drought occurs or if the USACE decides to reduce flows in the Missouri River to offset drought effects upstream in the main stem

reservoirs, the City will be without its primary water source. Cargill would stop production at the wet mill leading to catastrophic economic impacts to both the City and the industrial/commercial sector. During the drought of 2012, the river levels dropped to dangerous levels for the City. Without the new intake structures to access the City's primary source of water, the City's lack of drought resiliency will lower real estate values and reduce potential for economic development and reduce potential businesses from pursuing development within Blair.

2. Meets the goals and objectives of an approved integrated management plan or groundwater 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.

There are two specific plans that this project will address. The first is the Papio-Missouri River Natural Resources District's (NRD) Integrated Management Plan or IMP. The IMP was jointly developed by the Nebraska Department of Natural Resources (NDNR) and the NRD and it was adopted on August 31, 2014. Since adoption of their IMP the Papio-Missouri River NRD has submitted annual reports to NDNR reporting progress toward reaching the goals and objectives of the plan. Additionally, this project will support the goals and objectives of the Papio-Missouri River NRD's revised Groundwater Management Plan (GMP) adopted in 2016. A letter in support of Blair's Water Supply Resiliency Project from the Papio-Missouri River NRD is included as Attachment I. The specific goals and objectives that this project will support are as follows:

IMP Goal 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Objective 1.1 - Utilize existing policies and authorities of Papio-Missouri River NRD and NDNR to address water quantity issues.

Objective 1.3 – Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

GMP Water Sustainability Goal

Water use is sustainable when it promotes healthy watersheds and aquifers, improves water quality, protects water supplies through best management practices, and manages surface and groundwater resources conjunctively to protect the ability of future generations to meet their needs.

This project helps meet the IMPs first goal and objectives by allowing the City to use the Missouri River as its primary source of water instead of wells that would increase pressure on the groundwater resources in the area. The City currently withdraws

approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across and extensive wellfield (Attachment B). Installation of such a large wellfield would significantly reduce the capacity of future groundwater development in the area. There are over 250 wells currently registered with NDNR within a 3-mile radius of Blair. By constructing this new lower intake structure, these existing groundwater uses are protected from impacts of a new wellfield.

This project is an example of how a community is helping the NRD meeting its GMP water sustainability goal. As described in the previous paragraph, the project allows the City to use the Missouri River as it source of water (instead of groundwater) and therefore it is managing surface and groundwater resources to protect the ability of future generations to meet their water needs. Furthermore, by installing the new lower intake, the USACE will be able to regulate flow in the Missouri to maintain flows that promote a healthy watershed. The USACE manages the Missouri River to meet the goals of many users including agriculture, barge navigation, hydropower, flood reduction, recreational and fish and wildlife needs. The USACE needs this flexibility in their management of flows in the Missouri River to ensure that the needs of all these water users are met sustainably.

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 main way that this project contributes to water sustainability is by reducing aquifer depletion. The 2016 Water Source Study (Attachment B) evaluated seven different options that the City could pursue as sources of water during drought conditions and/or when the USACE reduces flows in the Missouri River to less than 9,000 cfs. Two of the options included groundwater development and both of these options would increase aquifer depletion in the area.

To estimate the location, area and amount of aquifer depletion that would result from construction of the 44-well wellfield, a groundwater model simulation of the wellfield impact was completed. Using the Lower Platte Missouri River Tributaries (LPMT) groundwater model developed by NDNR and Olsson's Groundwater Evaluation Toolbox or GET, a simulation of the conceptual vertical wellfield was completed. As defined in the 2016 Water Source Study, a well field with 40 active wells (and four inactive wells for redundancy) pumping at 350 gallons per minute would be needed to provide 20 MGD. The wells would need to be spaced approximately 1,000 feet apart and within a

2-mile radius of the water treatment plant. Figure 4 illustrates the conceptual wellfield layout that was tested using the LPMT groundwater model.

Based on this analysis, the water table would drop 70 feet when the wellfield was operating. The model simulation illustrates that this wellfield configuration is not sustainable and would impart a significant impact on the local aquifer. The results indicate that within one year of operations, the central portion of the wellfield would be dry.

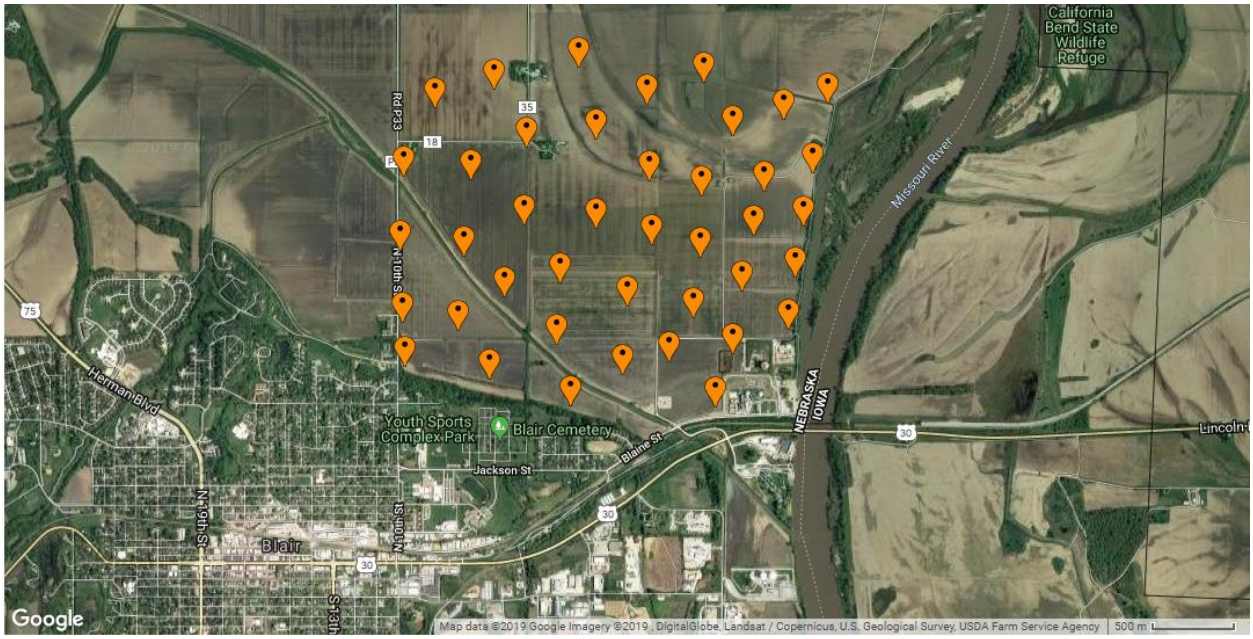

Figure 4 Conceptual wellfield layout used to simulate the effects of a vertical wellfield on the aquifer north of Blair.

The cross-basin benefits of this project include not relying on water from other basins such as the Platte River. Although an option to supply water to the City via a pipeline that accesses the Platte River was not evaluated as a source in the 2016 Water Source Study, it is not unreasonable looking at what other communities in Nebraska have done to ensure their supply is adequate to meet their needs. A radial collector well installed along the banks of the Platte River south of Fremont would require approximately 22 miles of pipeline to reach Blair's water treatment plant. Lincoln currently pipes its water from the Platte River wellfield over 40 miles to its customers. The current project to install a lower intake structure in the Missouri River will allow Blair to continue to rely on its water source within the Missouri River basin instead of access water from the Lower Platte basin and thus mitigating any cross-basin impacts.

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.

This project provides for multiple water supply goals that include:

1. Municipal and Industrial uses
2. Agricultural use
3. Conservation and preservation of water resources
4. Flood control
5. Hydropower
6. Navigation
7. Wildlife habitat
8. Recreational uses

1. Municipal and industrial water use. Clearly, the primary goal of this project is to provide uninterrupted water supply to Blair's municipal and industrial water users. This project will ensure that Blair has uninterrupted access to its source of water, the Missouri River, even during times of drought and low flow conditions when the current intake structure would be left high and dry. If this project is not constructed and a severe drought occurs or if the USACE decides to reduce flows in the Missouri River to offset drought effects upstream in the main stem reservoirs, the City will be without its primary water source. Cargill would stop production at the wet mill leading to catastrophic economic impacts to both the City and the industrial/commercial sector. During the drought of 2012, the river levels dropped to dangerous levels for the City. Without the new intake structures to access the City's primary source of water, the City's lack of drought resiliency will lower real estate values and reduce potential for economic development and reduce potential businesses from pursuing development within Blair.

2. Agricultural water use. There are over 250 wells currently registered with NDNR within a 3-mile radius of Blair. The City currently withdraws approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across and extensive wellfield (Attachment B). Installation of such a large wellfield would significantly reduce the capacity of existing wells and impact future groundwater development in the area. By constructing this new lower intake structure, these existing and future agricultural and rural water supply groundwater uses are protected from impacts of a new wellfield. If the intake structure is not built and instead even a small subset of the proposed wellfield was built, access to groundwater to support local agricultural needs would be impacted. As stated in the Water Source Study Report (Attachment B), on the western side of the Missouri River near the Blair water treatment plant, there is a high proportion of silt and clay material mixed in with the sand and gravel. This limits the potential yield of the alluvial aquifer. Further limitations due to increased municipal and industrial water supply wellfield development would reduce further development of agricultural water use.

3. Conservation and preservation of water resources. Blair has supported the NRDs efforts to encourage conservation and preservation of water resources by leading by example. Blair participated as a stakeholder during development of the GMP and encourages conservation to their citizens and industrial customers. They understand the impacts of their water demand on the local water supply. Building the new lower intake on the Missouri River will allow the City to continue to rely on surface water instead of developing a wellfield or radial collector well in the area. The City conserves groundwater resources in the area by minimizing the impacts of the city's water demand on local groundwater resources. As stated in item 3, this will protect the current agricultural water supply wells and irrigation system investments and allow for future development, as appropriate.

4-8. Flood control, hydropower, navigation, wildlife habitat, and recreational uses. Flow in the Missouri River is managed by the USACE under the authority of the Flood Control Act of 1944. Since the 40's, the USACE has operated the mainstem system of the Missouri River understanding the competing needs and responsibilities for flood control, hydropower, navigation, water rights and most recently, the impacts of river flow on fish and wildlife. As stated by Wallace Stegner, "Much of western history is a series of lessons in consequences," and it is not the goal of this grant application to justify any operational flow in the Missouri River as "better" or "more important" than another. The point is to bring up that by installing a new, lower water supply intake structure, the USACE will be able to operate the Missouri River with the flexibility needed to ensure that all beneficiaries of river flow including flood control, hydropower, navigation, wildlife habitat and recreators are better addressed.

The Master Manual is the primary guidance document for operation of the mainstem reservoirs of the Missouri River and reflects the USACE's interpretation of its statutory responsibilities and operating approaches. To supplement the Master Manual, the USACE prepares a more detailed Annual Operating Plan (AOP) each year and it was in the AOP that the USACE identified need to potentially reduce flows in the Missouri River to as low as 9,000 cfs during drought conditions. The Master Manual and AOP is written to address the competing goals of water users in the Missouri River Basin the following way (National Research Council, 2002):

> *"First, flood control will be provided for by observation of the requirement that an upper block of this intermediate storage space in each reservoir will be vacant at the beginning of each year's flood season, with evacuation scheduled in such a manner that flood conditions will not be significantly aggravated if at all possible (this space is available for annual regulation of flood control and all multiple purpose uses but should be vacant at the beginning of each flood season).*
>
> *Second, all irrigation and other upstream water uses for beneficial consumptive purposes during each year will be allowed for. This allowance also covers the effects of upstream tributary reservoir operations, as anticipated from operating plans for these reservoirs or from direct contact with operating agencies.*

Third, downstream municipal and industrial water supply and water quality requirements will be provided for.

Fourth, the remaining water supply available will be regulated in such a manner that the outflow from the reservoir system to Gavins Point provides for equitable service to navigation and power.

Fifth, by adjustment of releases from the reservoirs above Gavins Point, the efficient generation of power to meet the area's needs consistent with other uses and power market conditions will be provided for.

Sixth, insofar as possible, without serious interference with the foregoing functions, the reservoirs will be operated for maximum benefit to recreation, fish and wildlife."

The Blair Water Supply Resiliency project will make a significant difference in the future operations of the Missouri River which will allow the USACE to regulate flows that will contribute to multiple water supply goals. Without this project, the USACE will be restricted to operate flows in the Missouri that may jeopardize its ability to mitigate for flood control one year and drought mitigation the next. Continuing on the current path may lead to continued devastating floods and droughts like those experienced by Nebraskans along the Missouri River in 2011 and 2012.

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.

As stated in the Nebraska Constitution (Article XV Water), "those using the water for domestic purposes shall have preference over those claiming it for any other purpose". As stated in Nebraska State Statute 46-613, "Preference in the use of ground water shall be given to those using the water for domestic purposes. They shall have preference over those claiming it for any other purpose. Those using the water for agricultural purposes shall have the preference over those using the same for manufacturing or industrial purposes. As used in this section, (1) domestic use of ground water shall mean all uses of ground water required for human needs as it relates to health, fire control, and sanitation."

Thus, as defined by the state constitution and state statute, domestic water use is the highest beneficial use of waters of the state. The new lower intake structure will provide uninterrupted water supply to the Blair water treatment plant so that the City can provide

drinking water to the residents of Blair and its rural water customers (Figure 1, Blair Water System service area map).

The new intake structure will eliminate the need to install a vertical wellfield or radial collector well that would significantly impact the alluvial aquifer in and around Blair. The new intake system will provide added resiliency to the City's water supply during drought and low flow conditions due to Missouri River operational changes.

The new intake structure will provide redundancy to the water supply system and it will protect the operations of the world's largest wet mill facility. As one of the largest cities north of Omaha, protecting the Blair's infrastructure is of critical importance. Blair's water supply benefits the entire community including hospitals, fire departments, schools, nursing homes, and both state and federal government offices. Interruptions in the water supply impact these beneficial uses and will have a devastating impact on the community's economy and to the public services provided to its citizens through its hospital, fire department, schools, nursing homes, state and federal offices.

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.

In 2014, the City hired a consultant to perform a feasibility study to evaluate the options to mitigate against low river flows due to reduced releases from upstream reservoirs (Burns & McDonnell 2016, Attachment B). The study, called the Water Source Study, was produced collaboratively with the City, Cargill, and the consulting engineers. The study considered seven specific options that could be implemented to provide a reliable water source in times of drought and/or low flow conditions in the Missouri River. The options evaluated included:

1. Barge mounted pumps
2. Shallow alluvial wells
3. Radial collector wells
4. Expansion of the existing intake for low river levels
5. Passive wedge wire screen system in the river
6. Rail-mounted supplemental pumps
7. New, lower, intake structure

Each option was evaluated based on the following criteria:

- Ability to provide the needed quality and quantity of water
- Long-term reliability
- Challenges of the system (operational and permitting)
- Cost to develop and implement

According to the study, the only option without significant permitting, operational, cost, or constructability challenges is the option to construct a new, lower intake (Table 2).

Table 2 Evaluation Matrix for Blair's Drought Resiliency Options

	Evaluation Criteria			
Option Description	**Meets Demand**	**Reliability**	**Challenges**	**Estimated Cost**
Barge-mounted pumps	Yes	Low	Significant	$750,000
Shallow alluvial wells	Yes	High	Moderate	$45,000,000
Radial collector well	Yes	High	Moderate	$40,000,000
Expansion of existing intake	Yes	High	Significant	$20,000,000
Rail-mounted pumps	Yes	Low	Moderate	$1,000,000
Passive wedge wire screens	Yes	Moderate	Significant	$15,000,000
New, lower intake structure	Yes	High	Minimal	$15,050,000

Green = good option, yellow = moderate risk of failure, red = significant threat to project or high cost

The pros and cons for each option are documented in the report and the key factors are summarized here:

1. Barge mounted pumps
    - Potential ice damage to barges during winter reducing reliability of this option
    - Difficulty finding contractor and crew to install, maintain, and remove barges
    - Cost, scheduling and permitting issues with regard to having barges on hand when needed
    - Barge contractors and crews not readily available in Omaha due to lake of barge traffic on the Missouri River
2. Shallow alluvial wells
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Forty-four wells spaced across a large area would be required to meet the water demand
    - Significant land acquisition required for well field
    - Significant amount of piping would be required to supply water to the Water Treatment Plant (WTP)
    - Groundwater constituents and elevated hardness may require changes to the WTP
    - Significant cost associated with this option
3. Radial collector well
    - An extensive hydrogeologic investigation would be required to verify hydraulic connection between the river and the aquifer
    - Geology on west bank of the Missouri River has much less productive alluvial aquifer than the east side based on geologic profile
    - Significant amount of piping would be required to supply water to WTP, especially if only the east side of the river could accommodate a radial well

- Groundwater constituents and elevated hardness may require changes to the WTP
- Significant cost associated with this option

4. Expansion of the existing intake for low river levels
   - Cost is as high or higher than constructing a new intake structure
   - Significant sheeting and shoring required for construction
   - Risk of significant turbidity increase in municipal supply during construction
   - Increased risk from construction interrupting water supply
5. Rail Mounted Supplementary Pumps
   - Current users remove and re-install pumps which is an interruption in service
   - Full structural evaluation of existing intake would be required to prove a rail system addition would not compromise structural integrity of current intake
   - High operation and maintenance cost
6. Passive wedge wire screen system in the river
   - Minimal clearance of screen during periods of low river flow
   - Minimal clearance may cause issues with ice on river during winter months
   - Minimal clearance may pose permitting issues with US Coast Guard
   - River debris can pose a threat to the intake screens
   - Additional permitting with US Coast Guard would be required
   - Significant operational and maintenance costs including the cost of divers for required screen maintenance
7. New, lower intake structure
   - Although the new lower intake is not the lowest cost alternative, it provides redundancy in water supply that will allow for maintenance of existing intake
   - Provides for future expansion to 20 MGD
   - The new intake is higher cost than both the rail-mounted and barge mounted supplemental pumps but does not have the operational issues or interruptions in service
   - Uses existing electrical building for control components and pumps
   - Will not require changes to the WTP because water chemistry is the same

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.

Installation of the new lower intake structure helps the state meet the obligations of two state plans: the Papio-Missouri River NRDs IMP and GMP. The project also helps the state meet the Federal obligations of the Safe Drinking Water Act (SDWA), the Flood Control Act of 1944, the Clean Water Act (CWA), the Endangered Species Act and the National Environmental Policy Act (NEPA).

1. Papio-Missouri River NRDs IMP and GMP. There are two specific plans that this project will address. The first is the Papio-Missouri River NRD's Integrated Management Plan or IMP. The IMP was jointly developed by the NDNR and the NRD and it was adopted on August 31, 2014. Since adoption of their IMP the Papio-Missouri River NRD has submitted annual reports to NDNR reporting progress toward reaching the goals and objectives of the plan. Additionally, this project will support the goals and objectives of the Papio-Missouri River NRD's revised GMP adopted in 2016. A letter in support of Blair's Water Supply Resiliency Project from the Papio-Missouri River NRD is included as Attachment I. The specific goals and objectives that this project will support are as follows:

IMP Goal 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Objective 1.1 - Utilize existing policies and authorities of Papio-Missouri River NRD and NDNR to address water quantity issues.

Objective 1.3 – Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

GMP Water Sustainability Goal

Water use is sustainable when it promotes healthy watersheds and aquifers, improves water quality, protects water supplies through best management practices, and manages surface and groundwater resources conjunctively to protect the ability of future generations to meet their needs.

This project helps meet the IMPs first goal and objectives by allowing the City to use the Missouri River as its primary source of water instead of wells that would increase pressure on the groundwater resources in the area. The City currently withdraws approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across and extensive wellfield (Attachment B). Installation of such a large wellfield would significantly reduce the capacity of future groundwater development in the area. There are over 250 wells currently registered with NDNR within a 3-mile radius of Blair. By constructing this new lower intake structure, these existing groundwater uses are protected from impacts of a new wellfield.

This project is an example of how a community is helping the NRD meeting its GMP water sustainability goal. As described in the previous paragraph, the project allows the City to use the Missouri River as it source of water (instead of groundwater) and therefore it is managing surface and groundwater resources to protect the ability of future generations to meet their water needs. Furthermore, by installing the new lower intake, the USACE will be able to regulate flow in the Missouri to maintain flows that promote a healthy watershed. The USACE manages the Missouri River to meet the goals of many users including agriculture, barge navigation, hydropower, flood

reduction, recreational and fish and wildlife needs. The USACE needs this flexibility in their management of flows in the Missouri River to ensure that the needs of all these water users are met sustainably.

2. SDWA. The SDWA applies to every public water system in the United States. The City provides clean drinking water through its Department of Public Works by treating surface water from the Missouri River in its water treatment plant to the standards set in the SDWA. This project provides the necessary infrastructure improvements to efficiently and reliably supply safe drinking water to the citizens, commercial, industrial and rural water users in and around Blair (Figure 1, Blair Water System service area map). Without this project, low flow conditions in the Missouri River will leave Blair's intake structure high and dry which will jeopardize Blair's ability to stay in compliance with the SDWA's requirement that the city provide clean drinking water to the community.

3. Flood Control Act of 1944, the CWA, NEPA and the Endangered Species Act. Flow in the Missouri River is managed by the USACE under the authority of the Flood Control Act of 1944. Since the 1940's, the USACE has operated the mainstem system of the Missouri River taking into consideration its responsibilities to maintain operations that are consistent with Federal law and regulations developed with passage of the CWA, NEPA and the Endangered Species Act. For example, the pronounced drought of 1988–1992 affected most parts of the Missouri River basin. Negative impacts on reservoir-based recreation (upstream), on navigation (downstream), and on threatened and endangered species were so severe that in 1989, Congress directed the USACE to review the Master Manual. The Master Manual is the primary guidance document for operation of the mainstem reservoirs of the Missouri River and reflects the USACE's interpretation of its statutory responsibilities and operating approaches. That review was conducted according to guidelines in the NEPA which required the USACE to conduct an environmental impact statement (EIS) regarding changes in dam operations. To supplement the Master Manual, each year the USACE prepares a more detailed Annual Operating Plan and in April 2013, the USACE notified Blair that it may need to reduce flow in the Missouri to 9,000 cfs in the fall due to drought conditions. This project will support implementation of the USACE's Annual Operating Plans for the Missouri River and provide the needed flexibility in operations to meet the requirements of the Flood Control Act, CWA, NEPA and the Endangered Species Act.

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 Untied 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.

Clearly, by allowing the USACE flexibility to regulate the amount of water flowing in the Missouri River downstream of Gavins Point Dam, substantial threats to infrastructure in the lower Missouri River basin are reduced. Furthermore, the same flexibility would allow the USACE to reduce flows in the Missouri downstream of Gavins Point Dam to store more water in the six reservoirs upstream of Gavins Point for use in the upper Missouri River basin during times of drought (Figure 5). To quantify the impacts of these two devastating scenarios, one need only look at the impact of the floods along the Missouri River in 2011 and the drought that occurred in 2012 to see the impacts of both.

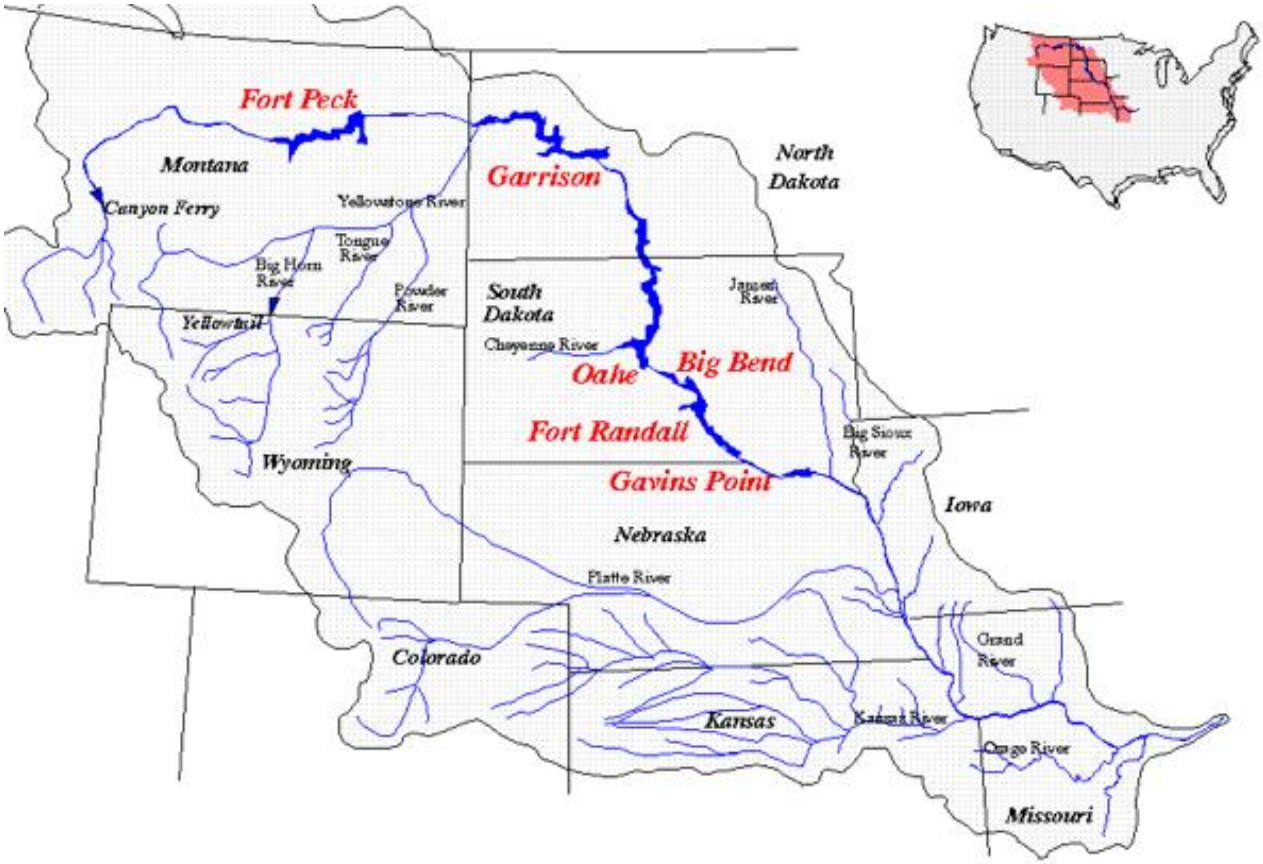

Figure 5 The Missouri River watershed with the six reservoirs regulated by the USACE.

In a report analyzing, among other things, the USACE's release decisions during the flood of 2011 and the subsequent drought of 2012 the following summary was presented in the US Government Accountability Office (GAO) report (September 2014):

> *"In 2011, large amounts of snow and extreme rains along the Missouri River led to the highest runoff levels since recordkeeping began in 1898 and prompted the Corps to release a record volume of water from the dams to prevent the dams*

from being overtopped, which could have caused catastrophic dam failure. These high runoff levels and high-water releases caused significant flooding and damage along the river from Montana to Missouri and disruption that affected farms, homes, businesses, industries, public infrastructure, and transportation networks. According to the Corps' After Action Report, the flood costs borne by the Corps were approximately $1 billion, including direct flood damages, response activities during the flood fight, and subsequent repair activities. After the flood, both 2012 and the spring of 2013 were dry, leading to drought conditions in parts of the Missouri River basin and causing the Corps to reduce releases from the dams to conserve water. The Corps' release decisions and communication during the recent flood and drought affected stakeholders with interests in the management of the river—including navigators, municipalities that draw drinking water from the river, farmers who use river water for irrigation, and conservationists seeking to protect fish and bird habitats…

…The extreme flood of 2011 followed by severe drought in 2012 and 2013 created challenging conditions on the Missouri River for the Corps. Experts who participated in our meeting agreed that the Corps made appropriate release decisions during the flood and drought, given the circumstances. However, the experts agreed that techniques such as probabilistic forecasting have the potential to improve the Corps' ability to make release decisions in nonextreme events."

Regarding drought impacts, loss estimates by the end of July 2012 were $12 billion and the droughts of 1988 and 1980 caused $78 and $56 billion in losses (adjusted for inflation to 2012 dollars) (National Oceanic and Atmospheric Administration 2013).

By constructing a lower intake structure on the Missouri River, the City is providing the USACE the flexibility it needs to be able to use the new forecasting techniques suggested in the GAO report to better manage flows in the Missouri River. The added operational flexibility may assist the USACE make release decisions during nonextreme events that may mitigate the effects of extreme flood and drought events on the residents of the Missouri River basin. The point being that any changes to the way that the USACE manages the Missouri River has the potential to minimize the enormous financial impacts of droughts and floods within the Missouri River basin. There is no way that one project will change the operations of the system to eliminate the impacts of these extreme events but even modest changes can make a significant impact to, for example, an agricultural producer in the northern Missouri Basin that has access to surface water for irrigation during a drought or to a producer that farms the fertile ground protected by levees along the lower reaches of the Missouri River.

Furthermore, by building the lower intake structure, there are direct benefits for public security, public health and safety for the citizens of Blair. The public safety benefits may be difficult to quantify but one way to evaluate the potential effect is to look at the critical operations that occur in Blair. Blair is the county seat and the largest community in

Washington County. According to the county website, the services that are available at the government offices in Blair include the following:

County Clerk
- Marriage Licenses
- Birth Certificates
- Property Valuation Protests
- Military Discharges
- Corporation & Partnership Filings
- Special Designated Licenses
- County Budget
- Voter Registration

County Assessor
- Property Tax Payments
- Property Valuation Protests
- Property Assessor's Calendar
- Homestead Exemption
- Property Tax Guides

County Treasurer
- Property Tax Payments
- Vehicle Titling
- Driver's License Examinations
- Driver's Licensing Services
- Driver & Vehicle Records
- Boat Registration Information

Additionally, there are both public and private schools, the Memorial Community Hospital and Health System, there are two nursing homes, a volunteer fire and rescue department, a local police department, and a library. Public health and safety are protected through the Fire and Rescue Department and hospital with critical care facilities that serve the majority of the county. A fundamental purpose of the Blair public water supply is to provide fire suppression. Blair has the largest all volunteer fire department within the Omaha metro area. Blair has two fire stations: North and South with two rescue units, three trucks, a ladder truck, three engines, a fire car, a hazardous material trailer, and a rescue boat. According to the State Fire Marshall's Office, Blair Volunteer Fire and Rescue Department has 65 members. With this Fire and Rescue Department operational, Blair has a favorable fire protection rating from the Insurance Services Office (ISO) which specifically looks at adequate and reliable water supply to the community. Any potential issues with the water supply can affect the ISO rating and cause significant insurance cost increases. Interruption of water service due to drought events or low flow conditions in the Missouri River could potentially have a debilitating effect on public security or public health and safety of Blair and Washington County's citizens. This project reduces threat of interruptions in Blair's water supply and maintains operations in the county government offices, local hospital and schools, and provides water to the rescue operations of the local police and fire departments.

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.

Of the seven options evaluated in the Source Water Study (Attachment B), the best option related to water quality is the new, lower water intake structure. The options evaluated included:

1. Barge mounted pumps
2. Shallow alluvial wells
3. Radial collector wells
4. Expansion of the existing intake for low river levels
5. Passive wedge wire screen system in the river
6. Rail-mounted supplemental pumps
7. New, lower intake structure

The reasons that the new, lower intake structure was favorable over four of the other options is as follows:

1. Barge mounted pumps have the potential to cause turbidity in the river during operation
2. Shallow alluvial wells would produce groundwater that has a different water chemistry than surface water which could potentially require costly upgrades to the water treatment plant.
3. Radial collector wells would produce groundwater that has a different water chemistry than surface water which could potentially require costly upgrades to the water treatment plant.
4. Expanding of the existing intake for low river levels would cause unacceptable levels of turbidity at the existing intake during construction

The last three options, passive wedge wire screens in the river, rail-mounted supplemental pumps at the current intake structure and a new lower intake structure all have the same minimal effect on water quality at the intake. Each option provides for the Missouri River water to be pumped into the water treatment plant. The public water treatment system consists of a lime-softening treatment facility with three clear wells, an elevated storage tank, two ground storage tanks and an integral distribution system serving the residents, commercial and industrial water customers in the City and several private areas outside the corporate limits including the Washington Country Rural Water System #2 which is operated by the Papio-Missouri River NRD.

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

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

The local jurisdiction that supports this project is the Public Works Department of the City and together the city and public works department have secured significant

financial support for this project. First, it should be clarified that the property tax levy in the City is not relevant to this application because the source of local matching funds for this project is generated from the water bills paid by the residents, commercial, industrial and rural customers. As such, since Cargill is the largest water service customer, a water service agreement that includes support for repayment of water improvement bonds is in place between the City and Cargill. Specifically, the agreement states that for the period 2016 through 2036, Cargill agrees to pay the City $538,900 on the first day of each month for a specified quantity of water and to support the repayment of bonds for water system improvements. The agreement states "bonds" shall refer to all outstanding and future loans, bond anticipation notes, bonds and other indebtedness issued to improve the Water System to provide service to Cargill. The full agreement is included as Attachment K. This agreement and the letter of support (Attachment L) confirms Cargill's commitment with the City to complete this important water system improvement project.

Additional organizations in support of the project are listed below and their letters of support are included as noted:

- Mayor Hansen's Letter of Support – Attachment M
- Blair Chamber of Commerce – Attachment N
- Gateway Support Letter – Attachment O

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.

In October 2015, the City adopted a Comprehensive Plan that outlines the priorities of the city to promote health, safety, morals, or general welfare as the community continues to grow and thrive (Attachment P). The plan specifically referenced practices like landscaping to encourage sustainable water use as follows:

> ***"****Landscaping. A well-designed landscape not only improves the aesthetics of a home or business; it can reduce water use and lower energy bills."*

The Comprehensive Plan also references the need for a new water intake structure:

> *"As flow rates are adjusted by the USACE throughout the Missouri River, the city will need to plan to adjust its water source intake system as well. An investment to extend the intake system via shallower depths of the river will likely be warranted."*

But the strongest argument for Blair's commitment to sustainable water use is their decision to install a new, lower water intake structure to access water in the Missouri River as its source instead of new wellfield that would dry up the local aquifer.

In 2014, the City hired a Burns & McDonnell to perform a feasibility study to evaluate six options that could be implemented to provide a reliable water source in times of drought and/or low flow conditions in the Missouri River (Attachment B). The options evaluated included:

1. Barge mounted pumps
2. Shallow alluvial wells
3. Radial collector wells
4. Expansion of the existing intake for low river levels
5. Passive wedge wire screen system in the river
6. Rail-mounted supplemental pumps
7. New, lower, intake structure

In 2016, Blair participated as a stakeholder during development of the Papio-Missouri NRDs GMP and encourages conservation to their citizens and industrial customers (See Attachment Q for a full list of the stakeholders). The City knew that by building the new lower intake on the Missouri River, they can continue to rely on surface water instead of developing a wellfield or radial collector well in the area. By building the new intake structure, the City conserves groundwater resources in the area by minimizing the impacts of the city's water demand on local groundwater resources. This project will protect the current agricultural water supply wells and irrigation system investments and allow for future development. That describes one aspect of water sustainability – water use is sustainable when it protects the ability of future generations to meet their water needs.

Currently, the City supplies 1-4 million gallons per day (MGD) to its 8,000 residential and rural water customers, 10-15 MGD to the Cargill biocampus, a large industrial user and regional employer, and about 2 MGD to other commercial and industrial customers. Cargill is the largest employer in the area where it has built and operates the world's largest wet corn milling facility. The primary beneficiaries of this project are the customers of Blair that will have a reliable water supply that is not interrupted when flows in the Missouri River are low because of drought or because the USACE is running the Missouri River at low flows. Additionally, by installing a new, lower water supply intake structure, the USACE will be able to operate the Missouri River with the

flexibility needed to ensure that all beneficiaries of river flow including flood control, hydropower, navigation, wildlife habitat and recreators are better addressed.

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.

Compliance with the revised Missouri River Operational Manual is a state-wide issue. By constructing a lower intake structure on the Missouri River, the City is providing the USACE the flexibility it needs to be able to better manage flows in the Missouri River. The added operational flexibility may assist the USACE make release decisions to lessen the impacts of extreme flood and drought events on the residents of Nebraska. And any changes to the way that the USACE manages the Missouri River has the potential to minimize the enormous financial impacts of droughts and floods within the Missouri River basin.

Figure 6 illustrates NASA satellite photos of eastern Nebraska a year before and days after the devastating floods in March 2019. In a recent congressional hearing, R. D. James, assistant Army secretary for civil works stated that a comprehensive study of flood control in the Lower Missouri River Basin is needed before the federal government rebuilds levees damaged by devastating floods this spring.

> *"It's a system; it's not just levees, and I would recommend after we've seen what happened in the Missouri Valley that the corps be given authority to at least look at what we could do to help protect that area."*

But this is not the first time this approach has been suggested. As stated in a 2014 study, "*The extreme flood of 2011 followed by severe drought in 2012 and 2013 created challenging conditions on the Missouri River for the Corps. Experts who participated in our meeting agreed that the Corps made appropriate release decisions during the flood and drought, given the circumstances. However, the experts agreed that techniques such as probabilistic forecasting have the potential to improve the Corps' ability to make release decisions in nonextreme events."*

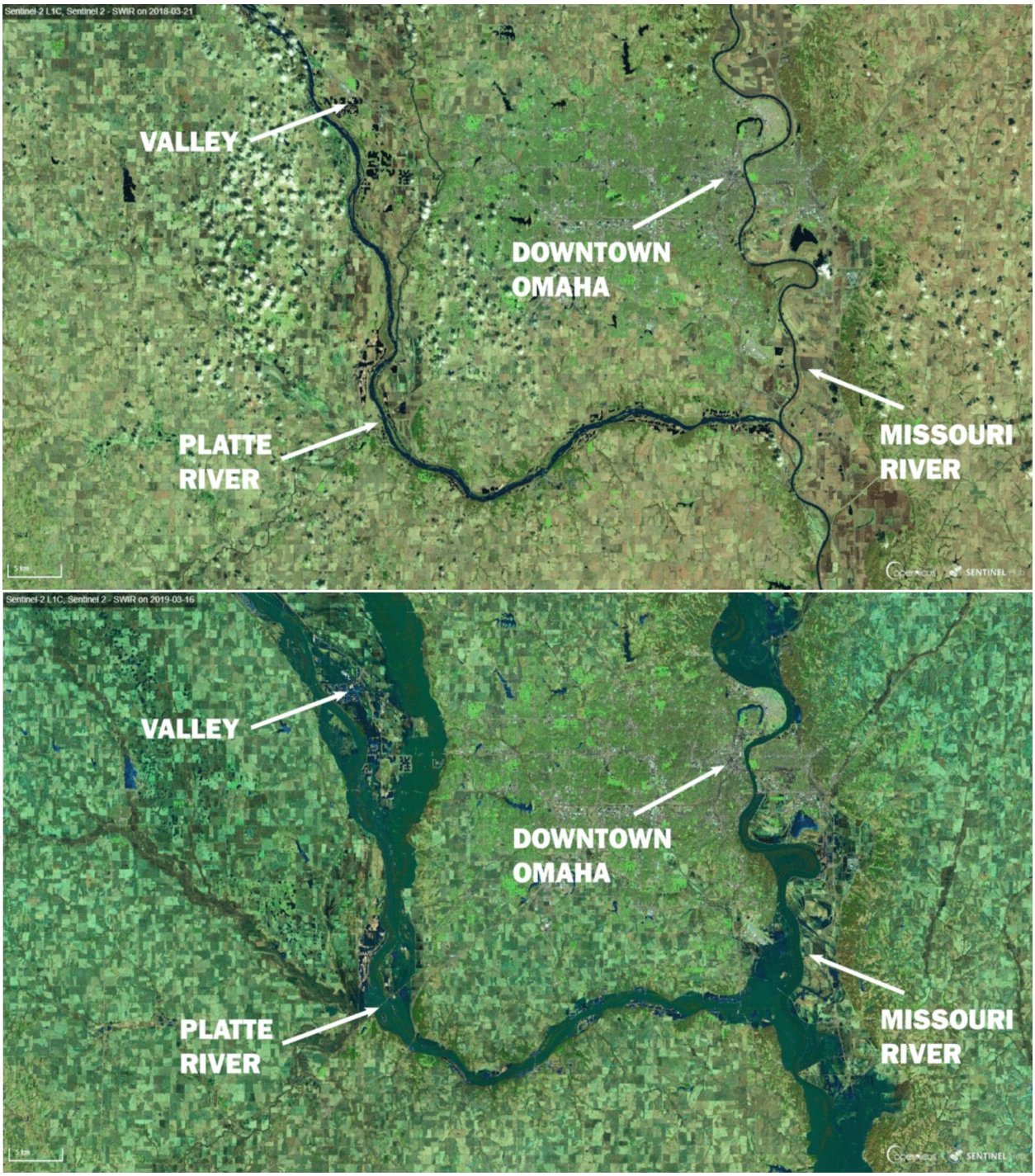

Figure 6 Satellite photos of eastern Nebraska before (March 21, 2018) and after the floods (March 16, 2019).

By lowering the intake structure on the Missouri River, the USACE will have the flexibility to implement any recommendations from the study that was just proposed to congress or the results of the 2014 GAO report that recommended probabilistic forecasting and flexible operational changes based on those predictions.

Flood control in the Lower Missouri River including the communities and farmland in eastern Nebraska along the Missouri River is not just a local issue. The 975,000 residents of the Omaha metropolitan area and Offutt Air Force Base lie along this flood-prone section of the river (Figure 7). This area is an important economic driver for our state as well as an important component of our nation's security system.

Figure 7 Satellite photos of Offutt Air Force Basin before and after the March 2019 flood.

There is no way that one project will change the operations of the entire Missouri River system enough to eliminate the impacts of these extreme events, but even modest changes can make a significant impact. The study proposed to congress to evaluate operations of the Missouri River as system across the upper and lower reaches will undoubtedly require flexibility in operational river flows that will be allowed with construction of a new, lower water supply intake structure for the City.

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.

Since Cargill is the largest water service customer for the City, a water service agreement that includes support for repayment of water improvement bonds is in place between the City and Cargill. Specifically, the agreement states that for the period 2016 through 2036, Cargill agrees to pay the City $538,900 on the first day of each month for a specified quantity of water (whether they use it or not) and to support the repayment of bonds for water system improvements. The agreement states "bonds" shall refer to all outstanding and future loans, bond anticipation notes, bonds and other indebtedness issued to improve the Water System to provide service to Cargill. The full agreement is included as Attachment K. This agreement and the letter of support (Attachment L) confirms Cargill's commitment to the City to complete this important water system improvement project.

Should the funding requested from Nebraska's Water Sustainability Fund not be granted, Blair will be required to fund the project by raising the water rates for its customers.

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.

When watersheds are healthy and functioning well, they provide food and fiber, clean water, and habitat for native plants and animals. Some of the ways that Blair's Water Supply Resiliency Project promotes healthy watershed are described here:

Preserving water resources. Building the new lower intake on the Missouri River will allow the City to continue to rely on surface water instead of developing a wellfield or radial collector well in the area. The City currently withdraws approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across and extensive wellfield (Attachment B). Based on an analysis completed for this application using NDNRs groundwater model for the Lower Platte Missouri River Tributaries, the water table would drop 70 feet when the wellfield was operating. The results indicate that within one year of operations, the central portion of the wellfield would be dry which would be a significant impact on the health and function of the watershed in this area. This would impact the ability of local agricultural producers to access groundwater for irrigation. For this reason, building a lower intake structure on the Missouri River is a better option for the local watershed to ensure that agricultural producers can continue to produce using their groundwater supplies.

Preserves habitat for plants and animals. Flow in the Missouri River is managed by the USACE under the authority of the Flood Control Act of 1944. Since the 40's, the

USACE has operated the mainstem system of the Missouri River understanding the competing needs and responsibilities for flood control, hydropower, navigation, water rights and most recently, the impacts of river flow on fish and wildlife. By installing a new, lower water supply intake structure, the USACE will be able to operate the Missouri River with the flexibility needed to ensure that all beneficiaries of river flow including flood control, hydropower, navigation, wildlife habitat and recreators are better addressed.

The Master Manual is the primary guidance document for operation of the mainstem reservoirs of the Missouri River and reflects the USACE's interpretation of its statutory responsibilities and operating approaches. To supplement the Master Manual, the USACE prepares a more detailed AOP each year and it was in the AOP that the USACE identified need to reduce flows in the Missouri River to 9,000 cfs during drought conditions. The Master Manual and AOP is written to address the competing goals of water users in the Missouri River Basin the following way (National Research Council 2002):

> *"First, flood control will be provided for by observation of the requirement that an upper block of this intermediate storage space in each reservoir will be vacant at the beginning of each year's flood season, with evacuation scheduled in such a manner that flood conditions will not be significantly aggravated if at all possible (this space is available for annual regulation of flood control and all multiple purpose uses but should be vacant at the beginning of each flood season).*
>
> *Second, all irrigation and other upstream water uses for beneficial consumptive purposes during each year will be allowed for. This allowance also covers the effects of upstream tributary reservoir operations, as anticipated from operating plans for these reservoirs or from direct contact with operating agencies.*
>
> *Third, downstream municipal and industrial water supply and water quality requirements will be provided for.*
>
> *Fourth, the remaining water supply available will be regulated in such a manner that the outflow from the reservoir system to Gavins Point provides for equitable service to navigation and power.*
>
> *Fifth, by adjustment of releases from the reservoirs above Gavins Point, the efficient generation of power to meet the area's needs consistent with other uses and power market conditions will be provided for.*
>
> *Sixth, insofar as possible, without serious interference with the foregoing functions, the reservoirs will be operated for maximum benefit to recreation, fish and wildlife."*

It is through this project that the USACE will be able to regulate flows that meet the six competing goals within its Operations Manual which will ultimately help preserve the habitats for plants and animals within the Missouri River basin.

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.

As noted on the NDNR website (dnr.nebraska.gov):

> *"The Ground Water Management and Protection Act (Neb. Rev. Stat. §§ 46-701 through 46-753) outlines the requirements for NeDNR to annually evaluate the expected long-term availability of hydrologically connected water supplies. This evaluation is intended to identify when existing water uses may have insufficient water supplies now or in the future, such that integrated management planning efforts are required to be initiated. Completion of the annual evaluation is not required for river basins, subbasins, or reaches for which an integrated management plan is either being developed or already exists. At this time, all of the Natural Resources Districts throughout the state are currently participating in either a required or voluntary integrated management plan and the NeDNR does not have new information that would suggest that conducting the annual evaluation in 2018 or 2019 would result any different conclusions than those that were reached in the 2017 annual evaluation. Therefore, a comprehensive annual evaluation was not conducted for 2018 or 2019.*
>
> *If in the future NeDNR has reason to believe that a reevaluation may lead to a different determination as to whether a river basin, subbasin, or reach is fully or over-appropriated, NeDNR may perform an evaluation at that time.*
>
> *Additionally, significant progress has been made on the voluntary integrated management plans in the Lower Platte River Basin. The Upper Loup, Lower Loup Lower Platte South, and Papio-Missouri River NRDs have completed voluntary plans with the Department and the Upper Elkhorn, Lower Elkhorn, and Lower Platte North NRDs are all in developmental phases."*

Therefore, although there are no objectives listed in NDNR's 2019 Annual Review of Hydrologically Connected Water Supply to reference, NDNR continues to support and to report on the efforts of the Papio-Missouri River NRD in their implementation of their IMP and GMP. This project supports the following goals in the IMP jointly developed by the Papio-Missouri NRD and NDNR. The IMP was jointly developed by NDNR and the NRD and it was adopted on August 31, 2014. Additionally, this project will support the

goals and objectives of the Papio-Missouri River NRD's revised Groundwater Management Plan adopted in 2016.

IMP Goal 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Objective 1.1 - Utilize existing policies and authorities of Papio-Missouri River NRD and NDNR to address water quantity issues.

Objective 1.3 – Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

GMP Water Sustainability Goal

Water use is sustainable when it promotes healthy watersheds and aquifers, improves water quality, protects water supplies through best management practices, and manages surface and groundwater resources conjunctively to protect the ability of future generations to meet their needs.

This project helps meet the IMPs first goal and objectives by allowing the City to use the Missouri River as its primary source of water instead of wells that would increase pressure on the groundwater resources in the area. The City currently withdraws approximately 20 MGD from the Missouri River. To supply this amount of water from the local groundwater aquifer would require installation of forty-four wells across and extensive wellfield (Attachment B). Installation of such a large wellfield would significantly reduce the capacity of future groundwater development in the area. There are over 250 wells currently registered with NDNR within a 3-mile radius of Blair. By constructing this new lower intake structure, these existing groundwater uses are protected from impacts of a new wellfield.

This project is an example of how a community is helping the NRD meeting its GMP water sustainability goal. As described in the previous paragraph, the project allows the City to use the Missouri River as it source of water (instead of groundwater) and therefore it is managing surface and groundwater resources to protect the ability of future generations to meet their water needs. By installing the new lower intake, the USACE will be able to regulate flow in the Missouri to maintain flows that promote a healthy watershed. The USACE manages the Missouri River to meet the goals of many users including agriculture, barge navigation, hydropower, flood reduction, recreational and fish and wildlife needs. The USACE needs this flexibility in their management of flows in the Missouri River to ensure that the needs of all these water users are met sustainably.

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.

Installation of the new lower intake structure helps the state meet the Federal obligations of the SDWA, the Flood Control Act of 1944, the CWA, the Endangered Species Act and NEPA.

SDWA. The Blair Resiliency project helps the state meet the obligations of the Federal Law 93-523, otherwise known as the SDWA United States Code 42 § 300f. As a public water system, the Blair must comply with the SDWA. The City provides clean drinking water through its Department of Public Works by treating surface water from the Missouri River in its water treatment plant to the standards set in the SDWA. This project provides the necessary infrastructure improvements to efficiently and reliably supply safe drinking water to the citizens, commercial, industrial and rural water users in and around Blair. Without this project, low flow conditions in the Missouri River will leave Blair's intake structure high and dry which will jeopardize Blair's ability to stay in compliance with the SDWA's requirement that the city provide clean drinking water to the community.

Flood Control Act of 1944, the CWA, NEPA and the Endangered Species Act. Flow in the Missouri River is managed by the USACE under the authority of the Flood Control Act of 1944. Since the 1940's, the USACE has operated the mainstem system of the Missouri River taking into consideration its responsibilities to maintain operations that are consistent with Federal law and regulations developed with passage of the CWA, NEPA and the Endangered Species Act. The Master Manual is the primary guidance document for operation of the mainstem reservoirs of the Missouri River and reflects the USACE's interpretation of its statutory responsibilities and operating approaches. To supplement the Master Manual, each year the USACE prepares a more detailed Annual Operating Plan and in April 2013, the USACE notified Blair that it may need to reduce flow in the Missouri to 9,000 cfs in the fall during drought conditions. This project will support implementation of the USACE's Annual Operating Plans for the Missouri River and provide the needed flexibility in operations to meet the requirements of the Flood Control Act, CWA, NEPA and the Endangered Species Act.

This project is a perfect example of how the funds from Nebraska's Water Sustainability fund can help meet the goals of water sustainability here in Nebraska and across the Missouri River basin. As we all know, water is a finite resource and must be managed accordingly. The main way that this project contributes to water sustainability is by reducing aquifer depletion. The 2016 Water Source Study (Attachment B) evaluated seven different options that the City could pursue as sources of water during drought conditions and/or when the USACE reduces flows in the Missouri River to less than 9,000 cfs. Two of the options included groundwater development and both of these options would increase aquifer depletion in the area. An analysis of the impacts of the proposed wellfield on the local aquifer was tested using the LPMT groundwater model.

Based on the model results, the water table would drop 70 feet when the wellfield was operating. The model simulation illustrates that this wellfield configuration is not sustainable and would impart a significant impact on the local aquifer. The results indicate that within one year of operations, the central portion of the wellfield would be dry.

An additional sustainability benefit relates to the USACE operation of the Missouri River system. The Blair Water Supply Resiliency Project involves constructing a lower intake structure to ensure that Blair can withdraw water from the Missouri River during drought conditions or when the USACE reduces flows in the river. With the new, lower intake structure, the USACE will be able to operate the Missouri River with the flexibility needed to ensure that all beneficiaries of river flow including flood control, hydropower, navigation, wildlife habitat and recreators are better addressed.

This is a prime example of a project helping lead to water sustainability which according to the Water Funding Task Force's working definition of sustainability:

> *"Water use is sustainable when current use promotes healthy watersheds, improves water quality, and protects the ability of future generations to meet their needs."*
>
> Nebraska Water Funding Task Force, 2013

This project reduces impacts to local aquifers and leads to operational flexibility in the Missouri River basin addressing the needs of multiple stakeholders and water uses.