

# NEBRASKA NATURAL RESOURCES COMMISSION

## Water Sustainability Fund

Application for Funding

Section A.

### ADMINISTRATIVE

**PROJECT NAME:** Water Treatment Pilot Study and Filter Media Replacement

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

Sponsor Business Name: Village of Butte

Sponsor Contact's Name: Scott Brewster

Sponsor Contact's Address: 520 Thayer Street, PO Box 286

Sponsor Contact's Phone: 402-775-2426

Sponsor Contact's Email: villageofbutte@nntc.net

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

**Grant** amount requested. \$152,280

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

**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 <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
DNR Surface Water Right	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
USACE (e.g., 404/other Permit)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
FEMA (CLOMR)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Local Zoning/Construction	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Cultural Resources Evaluation	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Other (provide explanation below)	N/A <input type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>

The Nebraska Department of Environment and Energy (NDEE) has indicated that a change in filter media type would be viewed as a change in the treatment process. Therefore, a pilot study was necessary to demonstrate that water quality objectives would be met with the proposed alternate media. The Village anticipates sending the Filter Media Pilot Study Report to the NDEE in April 2023, and receiving NDEE authorization to change filter media type in May 2023.

Contract Documents for the media replacement project are expected to be developed in June 2023. A construction permit will then be applied for in accordance with Nebraska Title 179, Chapter 7, and it is expected to be received in July 2023.

The cost of the necessary pilot testing and pilot equipment rental was estimated at approximately \$72,900.

4. **Partnerships**

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

N/A

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

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.

The total cost of the proposed Project is estimated to be \$253,800. The Village of Butte has received American Rescue Fund Act (ARPA) funds in the amount of \$53,627.28 that they intend to apply to this project. This funding has been confirmed (see Attachment A – ARPA Funding). The Village of Butte intends to use this funding in its entirety as part of the required 40% match. The Village will investigate the use of loans, customer user fees, or use of Village reserve funds to fund the remaining portion of the required matching funds. The Village does have sufficient reserve funds to fund the remaining 40% match, if required. Refer to Attachment B – Village of Butte, Nebraska Financial Statements.

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 Village of Butte, Nebraska (Butte) is a small community located in Boyd County in north-central Nebraska. Butte owns and operates a small water treatment plant (WTP) that supplies drinking water to its residents. Butte is requesting cost share through the Water Sustainability Fund for the Butte Pilot Study and Filter Media Replacement Project (Project). The proposed Project will include the NDEE recommended pilot testing and the subsequent filter media replacement. In addition to finished water quality improvements, the Project seeks to address aging infrastructure.

The Butte WTP is a 170 gpm facility and consists of the following principal unit processes: aeration, chemical oxidation via sodium hypochlorite and detention, dual media filtration, and disinfection. The WTP treats groundwater from a shallow aquifer adjacent the Niobrara River. This groundwater source, there only source of water, is high in iron (Fe) and manganese (Mn). At an average raw water concentration of approximately 6 micrograms/liter (mg/L) Fe and approximately 2 mg/L Mn, the concentration of these constituents are several times higher than the National Secondary Drinking Water Regulations (0.3 mg/L Fe, 0.05 mg/L Mn) and the raw water Mn concentration is higher than the Health Advisory Level (HAL) established by the United States Environmental Protection Agency (USEPA) (0.3 mg/L lifetime health advisory and 1.0 mg/L one-day and ten-day health advisory). According to recent water quality testing, only about 50 percent of the raw water manganese is being removed in the existing treatment process. The elevated finished water manganese concentration has become a water quality concern, particularly as interest in manganese at the state and federal levels has increased over the years. Additionally, Butte has received several complaints over the last year from concerned customers regarding water that appears to be dirty, discolored, and potentially unsafe.

The Butte WTP was constructed in 1999 and several of its components have reached their anticipated design life. As noted above, Butte is having limited success removing manganese in the WTP process. Additionally, the filter media in the two existing pressure filters (12 inches of filter sand and 24 inches of anthracite) is over 20 years old. As a result, the Village is planning to replace the existing filter media and intends to use an alternate media designed to improve manganese removal / finished water quality (Greensand Plus or Pyrolox Advantage). The NDEE has indicated that this change in media type would be viewed as a change in the treatment process and has recommended that a pilot study be completed to demonstrate that water quality objectives would be expected to be met with the alternate media. Pilot testing was recently completed and a pilot testing summary report is currently in progress.

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):

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

- 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.

All remaining project tasks are expected to be completed in 2023. Planning level projected Project costs are summarized in Table 1. All costs are in March 2023 dollars (ENR CCI 13,176). A summary of Project costs and a breakdown of potential funding sources is summarized in Table 2.

*Table 1: Planning Level Projected Project Costs*

Item	Description	Unit	Total
1	Filter Media	LS	\$39,200
2	Remove and Replace	LS	\$32,800
3	Manufacturer Services	LS	\$4,300
4	Piping and Coatings	LS	\$10,000
A	Construction Subtotal		\$86,300
B	Instrumentation and Control	15.0%	\$12,900
C	Construction Subtotal = A+B		\$99,200
D	General Conditions, Mob., Demob.	15.5%	\$15,400
E	Bonds & Insurance	2.0%	\$2,000
F	Sales Tax	5.5%	\$5,500
G	Construction Subtotal = C+D+E+F		\$122,100
H	Miscellaneous Elements Not Itemized	20.0%	\$24,500
I	Construction Total = G+H		\$146,600
J	Engineering Devices Services		\$18,800
K	Engineering Services During Construction		\$12,500
L	Legal, Fiscal, Administrative	2.0%	\$3,000
M	Project Subtotal = I+J+K+L		\$180,900
N	Pilot Testing - Engineering Services		\$41,400
O	Pilot Testing - Equipment Rental		\$31,500
P	Project Total = M+N+O		\$253,800

*Table 2: Potential Funding Sources*

Year	WSF Grant	Butte Portion		Total Project Cost
		ARPA	Loan or Reserve Funding	
1	\$152,280	\$53,627.28	\$47,892.72	\$253,800

8. **IMP**

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

## Section B.

### DNR DIRECTOR'S FINDINGS

#### **Prove Engineering & Technical Feasibility**

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

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

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

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

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

The Butte Pilot Study and Media Replacement Project involves the replacement of filter media from within two existing pressure filters at the Butte WTP. Two alternate filter media are being considered, both designed to enhance manganese removal. Pilot testing was recently completed to evaluate the two media. The final replacement media will be selected based on data collected and evaluated during the pilot testing. Preliminary results from the pilot testing indicate that either media would result in a significant improvement on manganese removal. The Pilot Testing Protocol used during testing is provided in Attachment C. Preliminary analytical results from the pilot testing are summarized in Attachment D.

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

Two filter media designed to enhance iron and manganese removal (Greensand Plus and Pyrolox Advantage) were tested during piloting. The final replacement media will be selected based on data collected and evaluated during the pilot testing, as well as consultation with the manufacturer of the existing system, Kurita America. Contract Documents will then be prepared and the Project will be bid publicly. Once the Contract is awarded and a general contractor is selected, existing filter media will be removed and replaced from the first of two pressure filters. Once the media from the first filter has been removed, replaced, and the new media successfully commissioned, replacement of media in the second pressure filter will be permitted to begin. A floor plan of the existing WTP is displayed in Attachment E.

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

A pilot system was provided by Kurita America and pilot testing was completed for a period of 6 weeks from January 30, 2023 to March 13, 2023. The filter loading rate varied during the pilot period from 1.5 gpm/SF (the current design filter loading rate) to 3 gpm/SF. The Pilot Testing Protocol is provided in Attachment C. Preliminary pilot testing analytical results are provided in Attachment D. A pilot testing summary report is in progress and is anticipated to be completed in April 2023.

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

Figures 1 and 2 depict iron and manganese removal measured during pilot testing. Filter Column No. 1 (FC #1) included Greensand Plus. Filter Column No. 2 (FC #2) included Pyrolox Advantage. As observed in the figures, filter effluent iron and manganese concentrations were consistently below the secondary drinking water standard, representing a significant improvement over existing system operations.

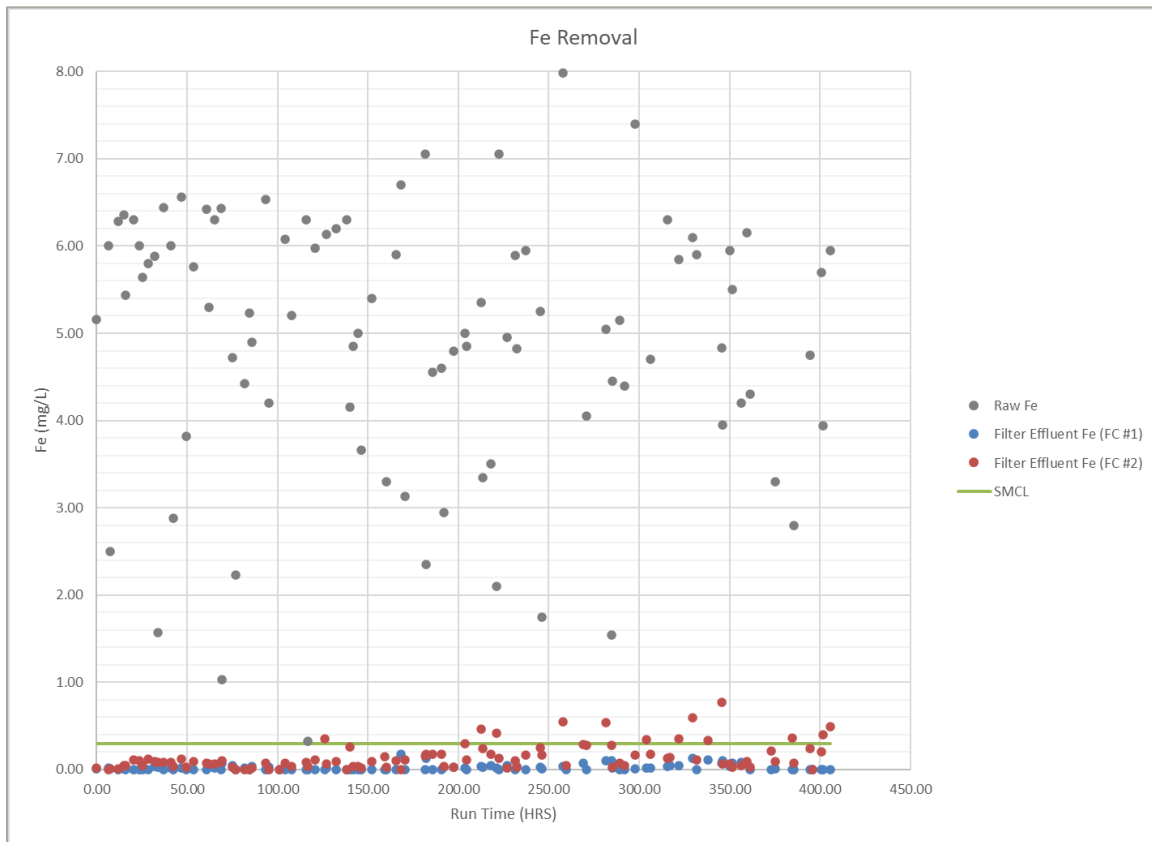


Figure 1: Preliminary Pilot Testing Results – Iron Removal

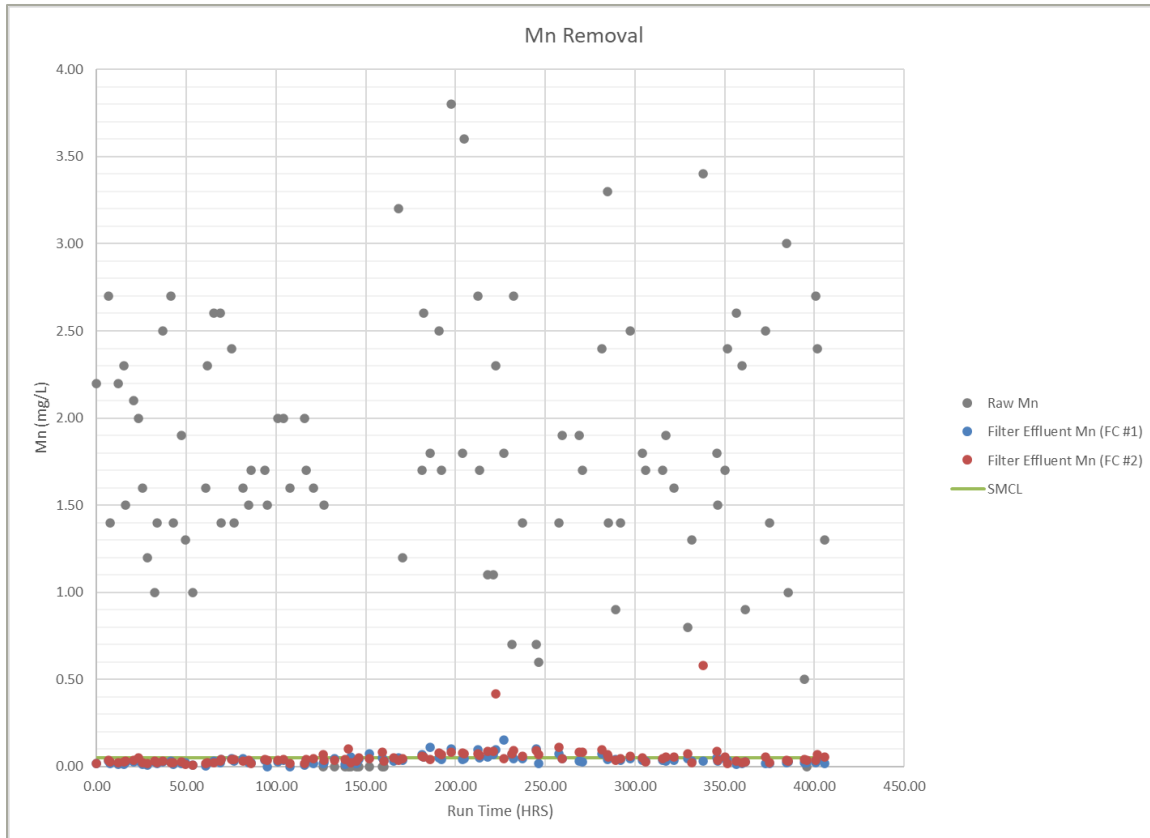


Figure 2: Preliminary Pilot Testing Results – Manganese Removal

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

Water and/or land rights are not applicable to this project. The project includes replacement of filter media within two existing pressure filters located within the existing Butte WTP.

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

A replacement filter media will be selected based on data collected and evaluated during the pilot testing, as well as consultation with the manufacturer of the existing system, Kurita America. Once the media is selected, Contract Documents will be prepared detailing the scope of work, materials of construction (i.e., filter media), and sequence of construction. The construction sequence will be carefully defined in an effort to enable the Butte WTP to remain operational to the greatest extent practicable during construction. Time of year for partial system shutdowns will be defined and a requirement to successfully remove, replace, and commission new media will be required before work on the next filter is permitted to start. Once the Contract Documents have been prepared public bids will be solicited and the Contract will be awarded to a general contractor based on the lowest responsive bidder. Improvements will then be executed in accordance with the Contract Documents.



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

A geologic investigation is not applicable to this project.

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

A hydrologic data investigation is not applicable to this project.

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

The existing filter media will be removed and new media will be installed. Final media selection will be based on data collected and evaluated during pilot testing, which be summarized in the pilot testing summary report. Criteria that will be considered during media selection will include the following: 1) estimated media cost, 2) iron and manganese removal effectiveness, 3) filter head-loss as a function of the time the filter is in operation following the most recent backwash (i.e., filter run times), and 4) specific backwash requirements for the media.

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 filter media is the portion of the filtration system that separates contaminants from the source water, and it is a critical element in the treatment process at the Butte WTP. Like other assets, filter media has a limited useful life. Operating for over 20 years, the media at the Butte WTP is beyond the typical life expectancy for this type of material. The filter media must be replaced to ensure that the Village of Butte can provide its customers with safe drinking water.

The next best alternative to replacing the media as planned with one of the media assessed during the pilot testing would be to replace the existing filter media in-kind (24 inches of anthracite over 12 inches of filter sand). However, although the existing treatment process and media is reliably removing iron from the source water, only approximately 50 percent of the naturally occurring manganese appears to be removed during the treatment process according to recent testing. This results in a finished water concentration around 1 mg/L. Having both aesthetic and potential public health impacts, the elevated manganese concentration in the finished water from the Butte WTP has become a water quality concern.

Another option that would enable the Village to achieve a significant reduction in finished water manganese concentrations would be to implement an alternate treatment process at the Butte WTP. Other water treatment processes that could be implemented to reduce source water manganese, such as lime softening, ion exchange, or reverse osmosis would require costly improvements at the Butte WTP. The proposed media replacement allows the Village of Butte to leverage their existing assets and water treatment process (chemical oxidation, detention, filtration), and is a more cost effective solution.

3. Document all sources and report all **costs** and **benefit data** using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies is the project life. ([Title 261, CH 2 - 005](#)).

The Project construction period is expected to be primarily driven by the period of time necessary to procure replacement media and is estimated to be approximately 4 to 6 months. The filter media is projected to have a useful life of approximately 10 years.

### **Costs**

#### **Capital Cost**

The Planning level projected Project cost is \$253,800. A breakdown of this cost is as follows:

- Construction: \$122,100
- Contingencies: \$24,500

- Engineering: \$31,300
- Administrative, Fiscal, and legal: \$3,000
- Pilot Equipment and Testing: \$72,900
  - Available ARPA funding: \$53,627.28

### O&M Costs

In 2022 the Village of Butte budgeted approximately \$78,900 on O&M at the Butte WTP. At this time, the Project is expected to have no direct material change on the annual O&M cost of the Butte WTP (reductions in source water pumping are expected but would be minor). Although significantly greater quantities of manganese are anticipated to be removed, which would be expected to affect the frequency of filter backwashes, the backwash frequency is actually projected to decrease (see discussion below).

### Future Replacement Costs

Assuming a future replacement cost equal to the initial capital investment, less the cost to rent pilot equipment and complete a pilot study, an interest rate of 5 percent, and a 10 year replacement period, the annualized future replacement cost would be approximately \$23,350.

The benefits associated with the Project are primarily non-monetary. The project would improve public health and provide environmental / sustainability benefits.

## **Benefits**

### Public Health

The benefits associated with the Project are largely related to public health. The Village of Butte owns the Butte WTP and operates the facility to provide drinking water to its customers. At this time, finished water manganese concentrations exceed the HAL established by the USEPA, as well as guidelines provided by the State of Nebraska. The Project would make it possible for Butte to improve its finished water quality and deliver safe drinking water to the community of Butte, NE and all other users of the Butte WTP. Pilot testing shows that levels of finished water manganese reliably at or below the secondary drinking water regulations was possible with this source water.

### Environmental / Sustainability

The Project would also provide environmental / sustainability benefits. The media replacement is essential to continued effective treatment at the Butte WTP. Therefore, replacing the aged media allows Butte to continue to leverage their WTP assets effectively. Additionally, Butte currently backwashes the existing pressure filters after approximately 12 hours of operation. Backwash waste water is directed to the existing residuals lagoon at the WTP site. However, differential pressure data collected during pilot testing indicates that filter run times could be easily tripled without adversely effecting water quality. Less backwash water is projected after completion of the Project, resulting in a decreased source water pumping.

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

The Planning level projected Project cost is \$253,800. A breakdown of this cost projection is as follows:

- Construction: \$122,100
- Contingencies: \$24,500
- Engineering: \$31,300
- Administrative, Fiscal, and legal: \$3,000
- Pilot Equipment and Testing: \$72,900
  - Available ARPA funding: \$53,627.28

The Project construction period is estimated to be approximately 4 to 6 months. The filter media is projected to have a useful life of approximately 10 years.

In 2022 the Village of Butte budgeted approximately \$78,900 on O&M at the Butte WTP. At this time, the Project is expected to have no direct material change on the annual O&M cost of the Butte WTP. The annualized future replacement cost is estimated at approximately \$23,350.

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

The primary tangible benefits associated with the Project are primarily non-monetary. The project would improve public health and provide environmental / sustainability benefits.

The benefits associated with the Project are largely related to public health. The Village of Butte owns the Butte WTP and operates the facility to provide drinking water to its customers. At this time, finished water manganese concentrations exceed the HAL established by the USEPA, as well as guidelines provided by the State of Nebraska. The Project would make it possible for Butte to improve its finished water quality and deliver safe drinking water to the community of Butte, NE and all other users of the Butte WTP. Pilot testing shows that levels of

finished water manganese reliably at or below the secondary drinking water regulations was possible with this source water.

The Project would also provide environmental / sustainability benefits. The media replacement is essential to continued effective treatment at the Butte WTP. Therefore, replacing the aged media allows Butte to continue to leverage their WTP assets effectively. Additionally, Butte currently backwashes the existing pressure filters after approximately 12 hours of operation. Backwash waste water is directed to the existing residuals lagoon at the WTP site. However, differential pressure data collected during pilot testing indicates that filter run times could be easily tripled without adversely effecting water quality (refer to Attachment D). Less backwash water is projected after completion of the Project, resulting in a decreased source water pumping.

- 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).

Annual cash flow data for the 10-year life if the Project is summarized in Attachment F – Cash Flow Table.

- 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.)

As indicated above, the primary benefits of the Project are non-monetary. The next best alternative would be to replace the existing media in-kind. However, this would be expected to result in continued elevated levels of manganese in finished water from the Butte WTP. It is difficult to assign a monetary value to the ability to provide safe drinking water to one's customers. Filter runs times with the replacement media could also be increased above current operations at the Butte WTP, resulting in fewer backwashes and reduced source water needs.

### **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 Village of Butte has ARPA funding available for the Butte Pilot Study and Media Replacement Project and is applying for this WSF grant. The Village is also exploring loan options, including funding through the DWSRF. Should grant or loan funding be unavailable, the Village would investigate funding necessary improvements through customer user fees or Village reserve funds. See

Attachment B, Village of Butte, Nebraska Financial Statements, dated September 30, 2022.

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

Refer to Attachment B, documenting the Village of Butte's budget for the 2021 and 2022 fiscal years. Each year the Village of Butte establishes an annual budget for Village expenses. The budget includes operation and maintenance expenses, as well as water system replacement costs at the Butte WTP. The Village of Butte will ensure that funds are allocated for costs related to the operation, maintenance, and future replacement costs related to the Project during the annual budgeting process.

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.).

The proposed Project involves improvements within the existing WTP and will not negatively affect the natural environment.

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

The Butte WTP is owned and operated by the Village of Butte. The completion of this application and execution of this project is endorsed by the governing body of the Village, the Village Board. The Village Chairman Scott Brewster and lead WTP operator will be responsible for overseeing the project construction, with engineering services during construction provided by HDR Engineering, Inc. Project construction will be performed by a general contractor licensed in the state of Nebraska.

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

The State of Nebraska has taken special interest in the concentration of manganese in drinking water over the last few years and recommends that water should not be consumed when manganese concentrations exceed 1,000 micrograms/liter (1 milligram/liter – "mg/L"). This Project will allow the Village of Butte to provide safe drinking water to its customers with finished water manganese concentrations well below the State of Nebraska guideline.

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. N/A

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

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 Butte WTP is owned and operated by the Village of Butte. The completion of this application and execution of this project is endorsed by the governing body of the Village, the Village Board. This grant application is being completed under the direction of the Village Board and will allow Butte to provide safe drinking water to its customers.

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

The filter media at the Butte WTP requires replacement. With a raw water manganese concentration of approximately 2 mg/L and a removal percentage during treatment of approximately 50 percent, the finished water delivered to from the Butte WTP exceeds (or nearly exceeds) the State guidelines for consumptive use (1 mg/L) and the USEPA HALs (0.3 mg/L lifetime HA and 1 mg/L one-day and ten-day HA). Failing to complete this project would be a public health concern. The proposed Project would make it possible for the Village of Butte to deliver safe drinking water to their customers with levels of manganese reliably at or below the secondary drinking water standard (according to preliminary pilot testing data) and well below the State and federal guidelines for safe public use.

## Section C.

### NRC SCORING

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

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

#### **Notes:**

- The responses to one criterion *will not* be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.
- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted above. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.
- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

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

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

The State of Nebraska recommends that manganese concentrations in water for public use not exceed 1,000 micrograms/liter (1 milligram/liter). This aligns with the USEPA one-day and ten-day health advisory for manganese (1 mg/L). As the



raw water concentration of manganese from the Village's only source of water is approximately 2 mg/L, and with recent testing data indicating that only about 50 percent of the naturally occurring manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meets this public health guideline. The Butte WTP supplies water to the Village of Butte, with a population of over 300 residents, as well as portions of the surrounding area. Failing to implement improvements at the Butte WTP to improve manganese removal would be a public health concern.

The existing filter media has been in service for over 20 years and is beyond the typical useful life for this type of material. Replacing the existing media with Greensand Plus or Pyrolox Advantage would be less sensitive to operational adjustments and would result in significant improvements in manganese removal and finished water quality.

Thus, the proposed Project would provide the necessary improvements to make it possible for the Village of Butte to deliver safe drinking water to their customers with levels of manganese reliably at or below the secondary drinking water standard (0.05 mg/L) (according to preliminary pilot testing data) and well below the State and federal guidelines for safe public use (1 mg/L, State guideline and federal one-day and ten-day HA, and 0.3 mg/L, federal lifetime HA).

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

N/A

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 Butte WTP is a 170 gpm facility treating groundwater from a shallow aquifer adjacent the Niobrara River. In current operations, the existing WTP backwashes

each of the two pressure filters after about 12 hours of operation. Backwash waste water is directed to the existing water residuals lagoon at the WTP site. However, differential pressure data collected during recent pilot testing indicates that filter run times could be easily tripled without adversely effecting water quality (refer to Attachment D). Less backwash water is projected after completion of the Project, resulting in a reduction in groundwater depletion.

Historically the WTP operates approximately every other day for about 8 to 12 hours a day depending on the time of year and water needs. Projecting the same usage into the future and assuming filter run times are extended to 36 hours after the media replacement, along with a design backwash rate of 850 gpm for a duration of 15 minutes, the Butte WTP would reduce its source water needs for backwashing by approximately 2.5 million gallons per year (from a projected 3.9 million gallons).

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;
  - List the goals the project provides benefits.
  - Describe how the project will provide these benefits
  - Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

The proposed Project would improve result in improved water supply goals for municipal and industrial uses and would conserve water resources.

The finished water quality from the Butte WTP is expected to be significantly improved following the proposed Project. Most importantly, the reduction in finished water manganese would allow for the Village of Butte to reliably provide drinking water to its customers for consumptive use within the guidelines recommended by the State of Nebraska (1 mg/L maximum manganese concentration for consumptive use) and below the federal health advisory levels established by the USEPA (1 mg/L one-day and ten-day HA and 0.3 mg/L lifetime HA). Secondly, reduced manganese concentrations would improve the aesthetic quality of water for other industrial and commercial uses.

Additionally, with an expected increase in filter run times from only about 12 hours currently to over 36 hours with the new media (refer to Attachment D), the Project is also expected to result in a reduction in source water pumping needs. Historically the WTP operates approximately every other day for about 8 to 12 hours a day depending on the time of year and water needs. Projecting the same usage into the future and assuming filter run times are extended to 36 hours after the media replacement, along with a design backwash rate of 850 gpm for a duration of 15 minutes, the Butte WTP would reduce its source water needs for

backwashing by approximately 2.5 million gallons per year (from a projected 3.9 million gallons).

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

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

The State of Nebraska has an abundance of groundwater resources. Unfortunately, the groundwater resource that the Village of Butte relies upon for public water supply uses has elevated levels of manganese. With a raw water concentration of approximately 2 mg/L, and with recent testing data indicating that only about 50 percent of the naturally occurring manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meets State and federal public health guideline. Completion of the proposed Project would make it possible for the Village of Butte to deliver safe drinking water to their customers with levels of manganese reliably at or below the secondary drinking water standard (0.05 mg/L) (according to preliminary pilot testing data – see attachment D) and well below the State and federal guidelines for safe public use (1 mg/L, State guideline and federal one-day and ten-day HA, and 0.3 mg/L, federal lifetime HA). The project will not reduce any beneficial uses of Nebraska's water resources, but would be a significant public health benefit to residents of Butte, Nebraska, as well as any other Nebraska residents in the state enjoying outdoor activities Boyd County.

6. Is cost-effective;

- List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.
- Compare these costs to other methods of achieving the same benefits.
- List the costs of the project.
- Describe how it is a cost effective project or alternative.

The Planning level projected Project cost is \$253,800. A breakdown of the projected cost, as well as O&M and future replacement costs is provided below.

- Construction: \$122,100
- Contingencies: \$24,500
- Engineering: \$31,300
- Administrative, Fiscal, and legal: \$3,000
- Pilot Equipment and Testing: \$72,900

- Available ARPA funding: \$53,627.28
- Existing Annual O&M Costs: \$78,900 (based on 2022 Butte Budget)
- Annualized Future Replacement Cost: \$23,350
  - Assuming a future replacement cost equal to the initial capital investment, less the cost to rent pilot equipment and complete a pilot study, an interest rate of 5 percent, and a 10 year replacement period, the annualized future replacement cost would be approximately \$23,350.

The benefits associated with the Project are primarily non-monetary. The project would improve public health and provide environmental / sustainability benefits.

The benefits associated with the Project are largely related to public health. The Village of Butte owns the Butte WTP and operates the facility to provide drinking water to its customers. At this time, finished water manganese concentrations exceed the HAL established by the USEPA, as well as guidelines provided by the State of Nebraska for safe consumptive use. The Project would make it possible for Butte to improve its finished water quality and deliver safe drinking water to the community of Butte, NE and all other users of the Butte WTP. Pilot testing shows that levels of finished water manganese reliably at or below the secondary drinking water regulations was possible with this source water.

The Project would also provide environmental / sustainability benefits. The media replacement is essential to continued effective treatment at the Butte WTP. Therefore, replacing the aged media allows Butte to continue to leverage their WTP assets effectively. Additionally, Butte currently backwashes the existing pressure filters after approximately 12 hours of operation. Backwash waste water is directed to the existing residuals lagoon at the WTP site. However, differential pressure data collected during pilot testing indicates that filter run times could be easily tripled without adversely effecting water quality (refer to Attachment D). Less backwash water is projected after completion of the Project, resulting in a decreased source water pumping.

To achieve the same objective, significantly improved manganese removal in the treatment process, the existing water treatment process could be largely abandoned and major improvements at the WTP could be implemented. Other processes that would effectively remove manganese from the source water include lime softening, ion exchange, and reverses osmosis, among others. However, these alternate solutions would be costly to implement. The proposed media replacement project allows the Village of Butte to leverage the existing assets and water treatment process (chemical oxidation, detention, filtration), and is the most cost effective approach.

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.

At this time, the United States Environmental Protection Agency (USEPA) classifies manganese as a secondary contaminant. The USEPA has established National Secondary Drinking Water Regulations (NSDWRs) that set non-mandatory water quality standards or “secondary maximum contaminant levels” (SCMCLs) for secondary contaminants. The SCMCL for manganese is 0.05 mg/L. The USEPA has also established health advisory levels (HAL) for manganese of 0.3 mg/L (lifetime HA) and 1 mg/L (one-day and ten-day HA).

As the raw water concentration of manganese from the Village’s only source of water is approximately 2 mg/L, and with recent testing data indicating that only about 50 percent of the manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meet the SCMCL or USEPA HAL. The Butte WTP supplies water to the over 300 residents of the Village of Butte, as well as portions of the surrounding area.

By replacing the existing filter media with one of the alternate media testing during piloting, the Village of Butte would be able to deliver safe drinking water to their customers with levels of manganese reliably at or below the SCMCL (according to preliminary pilot testing data) and well below the stated Nebraska guideline and USEPA HAL for safe public use.

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

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

The proposed Project would be a benefit to public health and safety. The Village of Butte owns and operates the Butte WTP to provide drinking water to its customers. Each of the over 300 residents of Butte, NE, as well as customers in the surrounding areas rely on the Butte WTP for safe drinking water. The Project would make it possible for Butte to deliver safe drinking water to their customers

with levels of manganese reliably below the stated Nebraska guideline and USEPA HAL for safe public use (0.3 mg/L, lifetime HA and 1 mg/L, one-day and ten-day HA and Nebraska guideline for public use).

9. Improves water quality;

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

The State of Nebraska recommends that manganese concentrations in water for public use not exceed 1,000 micrograms/liter (1 milligram/liter). This aligns with the USEPA one-day and ten-day health advisory for manganese (1 mg/L). As the raw water concentration of manganese from the Village's only source of water is approximately 2 mg/L, and with recent testing data indicating that only about 50 percent of the naturally occurring manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meets this public health guideline. The Butte WTP supplies water to the Village of Butte, with a population of over 300 residents, as well as portions of the surrounding area. Failing to implement improvements at the Butte WTP to improve manganese removal would be a public health concern.

The existing filter media has been in service for over 20 years and is beyond the typical useful life for this type of material. Replacing the existing media with Greensand Plus or Pyrolox Advantage would be less sensitive to operational adjustments and would result in significant improvements in manganese removal and finished water quality.

Thus, the proposed Project would provide the necessary improvements to make it possible for the Village of Butte to significantly improve finished water quality and deliver safe drinking water to their customers with levels of manganese reliably at or below the secondary drinking water standard (0.05 mg/L) (according to preliminary pilot testing data – See Attachment D) and well below the State and federal guidelines for safe public use (1 mg/L, State guideline and federal one-day and ten-day HA, and 0.3 mg/L, federal lifetime HA).

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.

Replacement of the existing filter media is essential to the community of Butte Nebraska and other customers of the Butte WTP. The Village of Butte has received ARPA funding for the project and intends to fully utilize these funds on project execution. The Village is also prepared to leverage reserve funds to complete this critical project. Rate or property tax increase could also be evaluated if necessary. Reference Attachment B, Village of Butte, Nebraska Financial Statements.

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

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

The proposed project would benefit each of the Butte WTP users and would support sustainable water use by reducing the volume of source water required to produce safe drinking water. During the filtration process, particulate impurities are removed from the treated water. The filters require periodic cleaning by backwashing, which involves reversing the direction of the water through the filters to dislodge the impurities trapped in the media matrix. It is not atypical for filter run times to be reduced with media age. The existing pressure filters are being backwashed every 12 hours. Pilot testing indicates that filter run times with the new media could be significantly increased beyond the 12 hour run times by a factor of 3 or more without adverse water quality impacts.

The following is provided in an effort to quantify the reduction in source water needs through the implementation of the proposed Project. Historically the WTP operates approximately every other day for about 8 to 12 hours a day depending on time of year and water needs. Projecting the same usage into the future and assuming filter run times are extended to 36 hours, along with a design backwash rate of 850 gpm for a duration of 15 minutes, the Butte WTP would reduce its source water needs for backwashing by approximately 2.5 million gallons per year (from 3.9 million gallons).

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.

Elevated manganese levels in groundwater sources is a relatively common occurrence in the State of Nebraska and the Butte WTP is one of many public water systems with a water source impacted by this problem. Manganese concentrations in the Butte WTP's source water is high enough that the Butte WTP was one of six public water systems selected to have its source water analyzed by the NDEE as a part of a small program completed in 2021. The goal of the program was to assist the Village with decisions regarding the impact of manganese on drinking water in the community. The brief analysis conducted by the State is included in Attachment G.

Recognizing that elevated manganese levels can pose a risk to public health, the State of Nebraska has established a guidance level for the concentration of manganese in drinking water (1,000 micrograms/liter or 1 milligram/liter). As the raw water concentration of manganese from the Village's only source of water is approximately 2 mg/L (or higher according to the testing summarized in Attachment G), and with recent testing data indicating that only about 50 percent of the naturally occurring manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meets this public health guideline. This affects each of the residents of the Village of Butte (over 300), as well as portions of the surrounding area.

By replacing the existing filter media with Greensand Plus or Pyrolox Advantage The proposed Project would make it possible for the Village of Butte to deliver safe drinking water to their customers with levels of manganese reliably well below the state guideline.

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.

The Village of Butte has received ARPA funding and intends to fully utilize these funds on the proposed project. The Village is also exploring loan options,



including funding through the DWSRF. Should grant or loan funding be unavailable, the Village would investigate funding necessary improvements through customer user fees or Village reserve funds. See Attachment A, ARPA Payments, and Attachment B, Village of Butte, Nebraska Financial Statements, dated September 30, 2022.

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.

N/A

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

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

The proposed Project would meet portions of the first and fifth stated goal summarized in the NDNR Annual Report to the Legislature and Plan of Work.

Goal 1: Establish strong leadership, involvement, and support for science-based decision making that is necessary to sustain state and local water management outcomes – The proposed project leveraged science based exploration and testing (pilot testing) to assess the effectiveness of alternate filter media in an effort to demonstrate that water quality objectives (enhanced manganese removal in the water treatment process) would be met through completion of the media replacement.

Goal 5: Protect existing water uses through collaborative investments in water resource projects, planning, administration and permitting of surface water rights, and the registration of ground water wells – The Village of Butte has secured ARPA funding, is seeking WSF funding, and is exploring funding options through the DWSRF. This would be a collaborative investment for the State with the involvement of potentially multiple state administered funding sources. The project would also allow for one of the State's existing groundwater resources to continue to be used in the supply of drinking water to a small Nebraska community.

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.

At this time, the United States Environmental Protection Agency (USEPA) classifies manganese as a secondary contaminant with non-enforceable limits. However, it should be understood that the USEPA has increased the interest in manganese over the years. Manganese was one of 30 chemical contaminants included in the fourth Unregulated Contaminant Monitoring Rule (UCMR4) executed between 2018 and 2020. The USEPA already has established a health advisory levels (HAL) for manganese of 0.3 mg/L (lifetime HA) and 1 mg/L (one-day and ten-day HA) and it is possible that manganese levels will be added to federal standards for drinking water in the near future. If this were to occur it would not be unreasonable to assume that the federal limit would be in line with current HAL. See attachment H.

As the raw water concentration of manganese from the Village's only source of water is approximately 2 mg/L, and with recent testing data indicating that only about 50 percent of the manganese is being removed during treatment, the Butte WTP is not currently able to consistently supply water to its customers that meet the USEPA HAL.

By replacing the existing filter media with one of the alternate media testing during piloting, the Village of Butte would be able to deliver safe drinking water to their customers with levels of manganese reliably below federal guidelines for safe public use.

## List of Attachments

- A – ARPA Payments
- B – Village of Butte, Nebraska Financial Statements, dated September 30, 2022
- C – Pilot Testing Protocol
- D – Preliminary Pilot Data
- E – WTP Floor Plan
- F – Cash Flow Table
- G – NDEE Source Water Analysis
- H – Federal Interest in Manganese