D.2.2.2 TECHNICAL PROPOSAL CONTENT

Executive Summary

The executive summary should include:

- The date, applicant name, city, county, and state

  Date: July 20, 2022
  Applicant Name: *East Bench Irrigation District*
  Address: *1200 MT Hwy 41, Dillon, MT 59725 (Beaverhead County)*

- Please indicate whether you are a Category A applicant or a Category B applicant. If you are a Category B applicant, please briefly explain how you are acting in partnership with a Category A partner. Note: If you are a Category B applicant, you must include a letter from the Category A partner confirming that they are partnering with you and agree to the submittal and content of the proposal. See Section C.1. Eligible Applicants.

  The East Bench Irrigation District is a Category A Applicant

- A one-paragraph project summary that provides the location of the project, a brief description of the work that will be carried out, any partners involved, expected benefits, and how those benefits relate to the water management issues you plan to address. Please note: this information will be used to create a summary of your project for our website if the project is selected for funding. For example, note the following description of a project selected for funding in FY 2020:

  The East Bench Irrigation District (EBID) is in southwest Montana within Beaverhead County. The EBID Carter Creek Lining & Headgate Automation Project is classified as an irrigation rehabilitation project that will provide for lining of approximately 600 lineal feet of canal along with an upgrade of the gates on the Carter Creek and Wilson check structures with new automated gates and telemetry that will improve irrigation efficiency, conserve water, preserve water quality, and management water in the irrigation system. The primary purpose for the proposed lining and gate automation project is to conserve water diverted from the Beaverhead River and improve the irrigation efficiency within the EBID's water delivery system. Installing actuators to automate the gates at each structure, installing approximately 600 lineal feet of liner, and integrating the gates into the EBID's SCADA system will allow the EBID to remotely control flows within the canal system. The ability to remotely control the gates at each structure will significantly reduce operation and maintenance activities/costs, improve irrigation efficiency, conserve water, improve agricultural production, and develop agricultural acres. The manual structures cannot be effectively controlled to change water levels within the main canal when needed, are difficult to operate, and cause significant water shortages to turnouts especially later in the irrigation season. Primary issues are the check structures are difficult to access and the EBID has limited personnel to operate them when needed. Also, there is often insufficient head to divert water to turnouts, and the existing system is a hazard to EBID personnel and the public. To operate the system, the EBID must increase flows in the main canal by over 20 cfs to meet demand of users, water which could remain in Clark Canyon Reservoir or the Beaverhead River. Lastly, an existing 600-foot section of the main canal leading up to the Carter Creek Siphon is leaking over 2.5 cfs, has saturated the steep downslope bank of the canal which may lead to a major failure of the canal. This section of the canal will be lined to eliminate canal seepage into the underlying soil. Project partners include Reclamation, East Bench Irrigation District, and the water users. The proposed project will provide conservation, management, development, and preservation of Montana's water resources.

- State the length of time and estimated completion date for the proposed project. Note: proposed projects should not have an estimated construction start date that is prior to May 2023.

Proposed Construction Start Date: 10/2024
Proposed Construction End Date: 10/2026
Project Duration: 24 Months

- Whether or not the proposed project is located on a Federal facility.

The EBID is part of the East Bench Unit, a US Bureau of Reclamation Federal Facility. The unit is part of the Pick-Sloan Missouri Basin Program in southwestern Montana. The unit provides full irrigation service to 21,800 acres and supplemental irrigation service to another 6,200 acres. The EBID reports 25,000 acres are currently irrigated. Principal features include Clark Canyon Dam and Reservoir, Barretts Diversion Dam, East Bench Main Canal, and a system of laterals and drains.

Project Location

Provide detailed information on the proposed project location or project area including a map showing the specific geographic location. For example, {project name} is located in {state and county} approximately {distance} miles {direction, e.g., northeast} of {nearest town}. The project latitude is {##°##'N} and longitude is {###°##'W}.

The East Bench Irrigation District Carter Creek Lining & Headgate Automation Project is in Beaverhead County, MT approximately five miles northeast of the City of Dillon, MT. The Carter Creek structure is in Section 01, Township 07 South, Range 08 West. The Wilson Check Structure is in Section 11, Township 07 South, Range 08 West. The latitude and longitude of the Carter Creek and Wilson Check Structures are 47.254850º North, -112.531650º West and 47.236750 º North, -112.551380º West, respectively. A location map is provided as Exhibit 1.

Technical Project Description

Provide a more comprehensive description of the technical aspects of your project, including the work to be accomplished and the approach to complete the work. This description should provide detailed information about the project including materials and equipment and the work to be conducted to complete the project. This section provides an opportunity for the applicant to provide a clear description of the technical nature of the project and to address any aspect of the project that reviewers may need additional information to understand.

Proposed Rehabilitation Project

The EBID identified the Carter Creek and Wilson Check Structures as critical water distribution infrastructure that need rehabilitation because of water management concerns, safety hazards, water leakage, and difficulty operating the structures. There are two main rehabilitation improvements proposed including automating the Carter Creek and Wilson check structures and lining of a 600-foot-long section of the East Bench Main Canal that is underperforming. The technical background for the proposed improvements is described below.

Check Structures

The Carter Creek and Wilson check structures each consist of a reinforced concrete structure that is positioned in front of the Wilson and Carter Creek Siphons. Both check structures have a single 7' tall by 16' wide radial gate that controls water levels in the canal upstream and the flow of water through the structures into the downstream siphon inlet. On each side of the single gate, there is a 53" check opening as well as a sill overflow in each direction. In their current condition, the structures cannot efficiently convey water to end users because they are manually operated radial headgates. Without an automated gate control system, these structures require a significant amount of time to operate, especially because of the remote location.

Contributing to the problem is annually there is a significant water shortage impacting turnouts, especially later in the irrigation season. Water shortages lead to insufficient head required to divert water to turnouts, which in turn creates a hazard to EBID personnel and the public because of the access and system operations. To address low head, the EBID must increase flows in the main canal by over 20 cfs to meet demand. The EBID proposes to remedy system inefficiency and operation problems by automating the Carter Creek and Wilson Creek check structures on the main canal. The concrete and gates at each location are in good condition and can be rehabilitated by incorporating solar powered motors/actuators and automated gate controls on the existing structures. The upgrades will improve water management within their respective lengths of canal. Construction activities will include installation of telemetry system, new gear boxes, low-voltage motors, actuators, and solar-powered control systems.

Canal Lining

The EBID has also identified a portion of the main canal leading up to the Carter Creek Check Structure as critical water distribution infrastructure requiring rehabilitation because of water management concerns, safety hazards, and water loss. In its current condition, the main canal cannot efficiently convey water to the users of the system because of amount of leakage along this portion of the main canal. Without an integrated liner system, this portion of the main canal will continue to lose excessive amounts of water. The section of the main canal that leads up to the Carter Creek Check Structure and has saturated a portion of the canal bank, the ditch banks are steep as they approach Carter Creek, and the areas with saturated soil are unstable and could fail which could result in the EBID main canal washing into Carter Creek. The proposed project will rehabilitate 600 feet of the main canal with a new liner system to improve water management and eliminate water loss. Construction activities will include cleaning and reshaping the canal prism, the installation of a liner system, keying in the liner system into each bank of the canal, gluing or heat bonding the liner seams, the installation of ballast in the bottom of the canal, and minor grading. The proposed improvements will conserve water for irrigation of downstream farm units, improve management of the canal system, reduce water that must be diverted, and help sustain agricultural land.

Project Need

Improvements to the check structures are needed because the existing check structures are difficult to adjust and manage irrigation water efficiently. Adjustments to the check structure gates requires multiple daily trips, which is about 50 miles round-trip to check water flows and make the necessary adjustments to ensure end users receive the correct flow for downstream turnouts and lateral systems. However, this is rarely possible because the EBID has limited personnel and many other tasks must be completed each day that are critical to overall operation. Also, the access road to the check structures is difficult to navigate during adverse weather conditions. Daily travel is inefficient and unnecessary because of technology advances. With automation, a weekly manned trip to the site is sufficient to verify the function and condition of the check structures. Currently, access is limited, and the check structures often do not provide the appropriate amount of water for several days, leaving producers short or wasting extra water because the system is not properly adjusted.

The introduction of an automated gate system connected to the EBID's SCADA system will allow the EBID to monitor and control the checks from a remote location, thus limiting daily trips to the structure. The SCADA electronic monitoring system logs the check structure's operating history data, flows, and EBID personnel can adjust flows with computer software and an internet, cell phone, or radio connection. The new automated gate systems would increase the efficiency for delivering water to existing turnouts and laterals by allowing EBID staff to monitor water levels and make instantaneous adjustments to ensure the outflow and optimizing water delivery to match system capacity and conditions. Check structure adjustments could also be automated to adjust flows dozens of times each day based upon information from flow monitoring. By implementing this modern technology, the EBID can better regulate outflows and precisely match their real-time demand of water and water availability. The current operational process requires extra water from the EBID Main Canal to buffer high demand and mitigate water loss. Currently, the need to make flow changes is only determined when the ditch rider visits the site. Automating the check structures with battery operated solar gate actuators and servos will ensure water is available to meet demand vs. wasting or limiting water supply to end users.

In addition to check structure needs, an existing 600-foot-long section of the East Bench Main Canal is underperforming, and improvements are needed. Seepage losses and evapotranspiration have caused cropland at the end of the canal short of water, lowering crop yield. The cause of the seepage issue is due to well drained soils within this section of the main canal seeping water. The soils of the canal banks and the canal bottom are characterized as well drained silty sand with relatively high hydraulic conductivity. This soil type causes water to seep through the canal bottom and side at a rapid rate, which saturates the adjacent hillside. The saturated soil creates slope instability and significant water losses at this location. The seepage and evapotranspiration losses were measured by the EBID at 2.5 cfs or 833 ac-ft feet of water annually within this portion of the ditch. This water loss results in lowered crop yield on the downstream end of the system.

Site Visit

WWC Engineering (WWC) and EBID personnel conducted a site visit in 2021. During the visit, EBID personnel expressed concerns related to inefficient water management, safety issues with the two check structures, and excessive water loss on a portion of the main canal. The field inspection documented that irrigation efficiency is diminished, and that manual control of the check structures and remote location were impacting how much water entered the system, typically more than was necessary resulted in wasting water in some areas and insufficient water in other areas. It was noted during the inspection that canal erosion is taking place at the two structures and linked to the inability to properly control flow. As a result, the structures impact water quality in the Beaverhead and Ruby Rivers when unused water from the irrigation system is returned and has a large sediment load and high nutrient concentrations.

Using Schoklitsch's equation and field data/observations, approximately 192 cubic yards of sediment over the 168-day irrigation season is discharged from the EBID delivery system back to the Beaverhead and Ruby River. Through the implementation of the gate automation and canal lining project, the erosion and sediment loading will be minimized by up to 192 cubic yards per year for the 30-year design life of the proposed project and potentially longer. Reducing sediment and nutrient concentrations in the EBID system through improved water delivery efficiency and conserving water, water quality will be improved in the rivers. Cleaner water will help protect fish habitat as well as other aquatic and riparian species. Flow readings at various locations in the system will be used by EBID staff to monitor, quantify, and record flows within the EBID system.

The inspection also documented issues with the current structures are impacting crop production during peak irrigation periods. The conclusion was an inability to actively control the water levels within the canals requires rationing of water during peak irrigation, causing reduced crop production, and at other times wasting water and degrading water quality if end users don't need the cautionary water that eventually seeps into the soil or is wasted into the Beaverhead or Ruby Rivers.

The portion of the main canal leading up to the Carter Creek Check Structure also showed significant signs of leakage. The downstream side of the canal is steep and transitions into steep topography. The canal section showed signs of saturation and slumping, which is indicative of an unstable bank condition. The EBID identified the Carter Creek Check Structure, Wilson Check Structure and the leaking portion of the main canal leading up to the Carter Creek Check Structure as high priority sites for corrective measures to improve the irrigation system.

Specific Activities that will be Accomplished

Design/Permitting/Construction Oversight: The EBID will contract with a licensed Professional Engineer to complete the design of the East Bench Irrigation District Carter Creek Lining & Headgate Automation Project. The engineer will be responsible for the design of the proposed project, which will include, but is not limited new headgate gear boxes details, low-voltage motor/servo details, solar-powered automation system, SCADA system, canal liner, alignment/grade, details, etc. The Engineer will work with regulatory agencies to satisfy environmental compliance requirements. The Engineer will provide a final plan set and specifications for the proposed project to facilitate construction. The engineer will also provide advisory services during construction of the project to assure proper installation in accordance with the design plans and specifications.

Construction

The construction work is divided into two primary efforts targeting canal lining and check structure automation with SCADA system.

Canal Lining

All construction work will be contracted, and construction work will include the physical restoration of the canal within the project area. The restoration would include stripping all organic material from within the canal and reshaping the canal geometry to the desired dimensions. A consistent channel slope would be achieved by constructing a constant grade throughout the project area. The canal geometry would be reshaped to include a more consistent bottom width and 2H:1V side slopes to provide canal stability. Following these physical rehabilitations, a Huesker Canal3® liner would be installed within the canal prism.

The Huesker Canal3® liner would consist of a 20-mil composite geomembrane with 8 oz polyester nonwoven geotextile fabrics bonded to the top and bottom. This combined system allows for decreased installation efforts compared to other liner systems that require installation of multiple layers. The Canal3® liner would be installed directly on the canal bottom and canal banks. A 6-inch native soil ballast layer would be placed on top of the liner on the canal bottom to secure the liner in place and prevent floating caused by air becoming trapped under the liner and protect the liner from being damaged by wildlife traffic. The liner would extend to a height above the canal floor to provide approximately 1 foot of freeboard above the high-water level within the canal. The top edges of the liner would be keyed into the top of the banks to secure the liner on both sides. Exhibit 2 and Exhibit 3 shows the proposed placement and the canal dimensions with a typical Canal3® liner installation. Canal seepage is also visibly evident in the Exhibit 2. Seepage emanates from the north side of the canal on the canal bendway where the proposed liner is depicted, and a discharge area is observed downslope.

Rehabilitation of Main Canal with Canal3® liner would significantly reduce or eliminate seepage within the 600-foot project area, providing maximum water conservation. Irrigation efficiency within the Main Canal would be substantially improved, optimizing the canal's ability to provide additional water to downstream users. The proposed lining would also significantly reduce the O&M costs associated with the canal. In addition, Huesker Canal3® has an advantage over other liner systems in that its composition of recycled materials provides an additional environmental benefit. Based on these expected liner performance, project goals and objectives are achieved by implementing the improvements. Further, the EBID has recent experience with the Huesker Canal3® system after completing two separate lining projects upstream of this project site, which has proven to be successful by providing similar results to the current project goals. Constructing a liner consistent within two adjacent sections of the Main Canal and make installation of the canal liner within the 600-foot section relatively easy because the same construction method must be used.

Check Structure Automation and SCADA System

All equipment and installation will be contracted to automate the check structures. The proposed project will contract installation of a Supervisory Control and Data Acquisition (SCADA) system at the Carter Creek and Wilson check structures that provide the EBID with the ability to read remote flow readings upstream of the check structures. The SCADA system is a software package that is primary to the radio telemetry system needed to operate the check structures, and external to the telemetry system. This upgrade will allow the EBID to make remote gate adjustments at the check structure and substantially reduce the cost and time for O&M trips and allow staff to monitor and control water levels and flows in this portion of the canal from any location. Generally, the SCADA system would be comprised of a programmable logic controller (PLC) or remote terminal unit (RTU), a telemetry system, automated gate actuators at the check structures, and computer software that would allow the user access for the remote control of the structure's gates. The improvements involve the following components for installation:

- Carter Creek Check Structure Location: Automated headwater elevation monitor, remote temperature sensor (both air and water sensors), an automated flow measurement device upstream of the check structure, gate position monitors, gate actuators for the two 6' radial gate supports, a battery bank and solar panels, PLC panel, and antenna tower for transmission of data.

- Wilson Check Structure Location: Automated headwater elevation monitor, remote temperature sensor (both air and water sensors), an automated flow measurement device upstream of the check structure, gate position monitors, gate actuators for the two 6' radial gate supports, a battery bank and solar panels, PLC panel, and antenna tower for transmission of data.

- EBID Main Office: New computer system and telemetry software to read and display the incoming data, new antenna to receive data, a PLC panel, and connection to the power grid at the main office.

The proposed improvements will provide the EBID the ability to remotely monitor upstream flows, remotely control the gates at the Carter Creek and Wilson check structures, and remotely monitoring of water levels and flows within the canal. The telemetry system will involve a radio system and would involve the retrofitting of the existing gates at the check structures with remote actuators and servos to provide the ability for remote gate operations. The system would be designed for remote monitoring and control of the system from the EBID's office in Dillon. EBID staff would have mobile connection to the Dillon office via cellular data connection to be able to adjust them remotely from any location and at any time.

Installation of a SCADA system at the Carter Creek and Wilson check structures for the purpose of remote monitoring and control of the system would achieve the desired goals and objectives allowing for real-time stream flow monitoring upstream of the structures, remote monitoring, and control of gate positions at the check structures, and remote monitoring of the resulting canal water levels to ensure water levels are kept at a safe operating level and provide the amount of flow necessary in turnouts.

Evaluation Criteria

E.1.1. Evaluation Criterion A—Quantifiable Water Savings (28 points)

*Up to **28 points** may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency, supporting the goals of E.O. 14008. Points will be allocated based on the quantifiable water savings expected as a result of the project. Points will be allocated to give greater consideration to projects that are expected to result in more significant water savings.*

The proposed project will provide significant water savings by mitigating cautionary/excess water spill volume associated with manual check structures and excessive seepage from an underperforming irrigation canal. Implementation of these improvements will conserve a total of 7,497 acre-feet, or 2.44 billion gallons of water annually. EBID will maintain water flow measurement records to track and monitor the conservation benefits that will be realized from lining the 600-foot section of the main canal leading up to the Carter Creek Siphon and water flow through the two check structures.

Describe the Amount of Estimated Water Savings:

For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.

Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.

Significant water savings are realized by implementing the proposed improvements. The improvements reduce cautionary spill volume by automating the check structures and eliminates seepage from the main canal system through installation of canal liner. Implementation of these improvements will conserve a total of 7,497 acre-feet, or 2.44 billion gallons of water annually. Flow measurements, spills and calculations are provided in Appendix A.

Cautionary/Excess Water Spills

Based on EBID operation flow records and conversations with experienced EBID ditch riders, the Carter Creek and Wilson check structures often have cautionary waste spills of 30 cfs from releasing excess water. The total cautionary waste spill amounts to 3.25 billion gallons of water annually wasted during the 168-day irrigation season. Although some of the excess water discharges back to the Beaverhead or Ruby Rivers from downstream wasteways, there is excessive seepage, evapotranspiration losses, and erosion in the main canal. In addition, downstream wasteways lead to excessive sediment loading within the canal system, which impacts water quality in the Beaverhead and Ruby Rivers, depending on the location within the canal system. Based on the WWC field visit, and conversations with EBID personnel, approximately 33% of the cautionary waste flows returns to the Beaverhead River each year and 67% is lost to seepage and evapotranspiration. The cautionary spills are often discharged into Humphrey's Gulch (Wilson Check) and Carter Creek, which are both more than 4 miles from the Beaverhead River. Both drainages consist of sandy soils that are highly permeable, the drainages have stock ponds on the stream, and both drainages have large cross sections and low gradients that exacerbate and increase water loss.

Rehabilitation of the Wilson and Carter Creek Check Structure will conserve 20 cfs of the 30 cfs of cautionary spills. A net savings of 20 cfs or 2.17 billion gallons (6,664 acre-feet) of annual water conservation will occur. EBID will continue to keep water measurement records to monitor and track the conservation benefit that will come from automating the Carter Creek and Wilson check structures.

Canal Seepage

Flow in the 600-foot section of the main canal leading up to the Carter Creek siphon was measured by EBID personnel in 2021 due to concerns over seepage losses in this section of the canal. Measuring flow upgradient and downgradient of the 600-ft canal section showed a loss of 2.5 cfs, which was verified by calculations performed by WWC Engineering. Lining the 600-foot section of the main canal will save 2.5 cfs over the entire 168-day irrigation season, saving 833 acre-feet (271 million gallons).

Describe current losses:

Please explain where the water that will be conserved is currently going and how it is being used. Consider the following:

a. Explain where current losses are going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?

   Excess water is routed to the Ruby or Beaverhead Rivers, depending on the location of the excess water or if the water is lost to seepage. Approximately 7,497 acre-feet of water is wasted annually due to a lack or inability to properly control water levels in the main canal. Implementing the proposed improvements would allow the EBID to convey only the required minimum flows in the main canal and eliminate or significantly reduce the amount of water discharged into the Ruby and Beaverhead Rivers. As a result, excess discharges from the main canal or seepage into the local groundwater systems would be effectively eliminated or reduced, moderating the amount of sediment, nitrogen, phosphorous and chemicals discharged to the downstream ecosystem. The result will be to improve water quality, increase public health and safety, protect aquatic habitat, and help aquatic life and fish populations thrive.

b. If known, please explain how current losses are being used. For example, are current losses returning to the system for use by others? Are current losses entering an impaired groundwater table becoming unsuitable for future use?

A significant portion of the wasted water is not used meaning it is removed from the watershed via evapotranspiration or canal/stream seepage that is lost to the local shallow groundwater system. Water not lost from evapotranspiration is returned to the Ruby and Beaverhead Rivers, or through canal seepage into the deeper groundwater system. Deep groundwater travels much slower compared to surface water and will not likely be used during irrigation season. Returned surface water is used by downstream water users in the local watershed and on a larger scale in the Jefferson and Missouri River Basins. Returned water is used for in stream flow, crop irrigation, recreation, and electrical generation.

Based on the WWC field visit, and conversations with EBID personnel, approximately 33% of the cautionary waste flows returns to the Beaverhead River each year and 67% is lost to seepage and evapotranspiration. The cautionary spills are often discharged into Humphrey's Gulch (Wilson Check) and Carter Creek, which are both more than 4 miles from the Beaverhead River. Both drainages consist of sandy soils that are highly permeable, the drainages have stock ponds on the stream, and both drainages have large cross sections and low gradients that exacerbate and increase water loss.

However, the unused surface water is impacted from sediment and nutrients after entering the EBID. Returned surface water also has a much higher temperature than natural surface water in the rivers, resulting in a thermal impact to the rivers. Sediments, temperature, and nutrients are a threat to the rivers and EPA identified the rivers as impaired in their respective TMDLs. The returned surface water is detrimental to the aquatic systems in the Ruby and Beaverhead Rivers. While some of the lost water is used, a significant portion is not used because of evapotranspiration and seepage into the groundwater system. Water that is reused is impacted from pollutants identified in the respective TMDLs.

c. Are there any known benefits associated with where the current losses are going? For example, is seepage water providing additional habitat for fish or animal species?

No. The current water losses mitigated by the proposed improvements are about four miles from the Beaverhead River. Typically spills and seepage recharges the local shallow groundwater system on Wilson Creek and a direct surface discharge on Carter Creek may be possible, depending upon the time of year, snowpack, and local water use. There are no nearby aquatic resources that benefit from the water. In addition, the water quality is impacted. This project will improve water quality by reducing the amount of spilled water, groundwater recharge, and lesson the return flows into the Ruby and Beaverhead Rivers. Using less water by properly controlling the amount of water in the system reduces withdrawal of water needed from Clark Canyon Reservoir and the Beaverhead River, keeping scarce water where it has the most potential to benefit aquatic resources, the fishery, and wildlife resources.

Specific water quality concerns include the Ruby River from Ruby Dam to the Beaverhead River which has documented impacts from total phosphorous. The river was first listed in 2006 for total phosphorous. The river is listed as use class B-1, water quality category 5 and is a low priority for phosphorous. The Beaverhead River from Clark Canyon Dam to the Jefferson River has documented impacts from total nitrogen and total phosphorous. The river was first listed in 2018 for total nitrogen and total phosphorous. The river is listed as use class B-1, water quality category 5 and is a low priority for nitrogen and phosphorous. Fertilizer containing nitrogen and phosphorous is a common practice on agricultural fields.

The irrigation of these fields leads to high concentrations of these nutrients and water returned to the canal system, which discharges directly into the Ruby and Beaverhead River. Temperature is also important, as warmer temperatures create toxic conditions for fish, aquatic organisms, and facilitate toxic algal blooms for wildlife. Nutrient concentrations and water temperature may increase significantly in the EBID main canal which runs nearly 40 miles from the diversion. The proposed project will allow the EBID to control flows more precisely and minimize return flows to the Ruby and Beaverhead Rivers, thereby reducing sediment, temperature, and nutrient impacts.

Describe the support/documentation of estimated water savings:

Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal.

*In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are **not** sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.*

According to EBID flow data and experienced EBID ditch riders, manually operating the Carter Creek and Wilson check structures wastes 10 to 40 cfs, depending on the day and situation, with an average of loss of 30 cfs. The inability to precisely control flow in the canal network and water control structures is inefficient and can be corrected through automation. Appendix A includes available flow data and spills measured using a series of Cipolletti weirs and flumes. A small portion of wasted flow from the irrigation structures returns to the Beaverhead River, but WWC verified approximately 67% of the cautionary spills are lost every annually to seepage and evapotranspiration. Both check structures are located more than 4 miles travel distance from the Beaverhead River. Based on the 168-day irrigation season, the total annual water loss for the two structures amounts to an average of 20 cfs, 67% of the average total loss of 30 cfs (10 to 40 cfs), or 6,664 acre-feet (2.17 billion gallons) for the EBID and its users. This much water can be saved and kept in the river or canal system.

The EBID measured water loss in the canal. The canal flow measurement was completed using a hand-held flow meter at the upstream and downstream reach of the proposed canal lining project. The water loss was measured in 2021 and showed that the 600-foot section of the main canal leading up to the Carter Creek siphon was losing approximately 2.5 cfs to seepage, resulting in 833 acre-feet (271 million gallons) lost from the EBID system. As part of assessing the field measurement precision and accuracy, a seepage loss calculation was competed using Darcy's Law ($Q = kia$). The seepage loss (Q) through the 600-foot section was calculated to be 2.56 cfs as shown in the seepage calculations provided in Appendix A.

The total water loss is approximately 7,497 acre-feet (2.44 billion gallons) of water annually. It is important to point out that these water losses are minimized during periods of peak demand but represent an average over the water season. Details of wasted water measurements are in Appendix A. The Carter Creek Lining and Check Structures Automation Project will eliminate this water loss through improved management and operation of the canal system and the water control structures.

Please address the following questions according to the type of infrastructure improvement you are proposing for funding.

See Appendix A: *Benefit Quantification and Performance Measure Guidance* for additional guidance on quantifying water savings.

(1) **Canal Lining/Piping:** Canal lining/piping projects can provide water savings when irrigation delivery systems experience significant losses due to canal seepage. Applicants proposing lining/piping projects should address:

a. How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.

   The EBID measured water loss in the canal. The canal flow measurement was completed using a hand-held flow meter at the upstream and downstream reach of the proposed canal lining project. The water loss was measured in 2021 and showed that the 600-foot section of the main canal leading up to the Carter Creek siphon was losing approximately 2.5 cfs to seepage, resulting in 833 acre-feet (271 million gallons) lost from the EBID system. As part of assessing the field measurement precision and accuracy, a seepage loss calculation was competed using Darcy's Law (Q = kia). The seepage loss (Q) through the 600-foot section was calculated to be 2.56 cfs as shown in the seepage calculations provided in PER in Appendix A.

b. How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.

The EBID measured the discharge in the canal using a mechanical current-meter. The stream channel cross section was divided into multiple vertical subsections. In each subsection, the area is obtained by measuring the width and depth of the subsection, and the water velocity is determined using a current meter. In this case, WWC provided the EBID with a Global Water Flow Probe Model 102. The discharge in each subsection is computed by multiplying the subsection area by the average measured velocity. The total discharge is then computed by summing the discharge of each subsection. Annual Canal seepage is calculated by multiplying the flow lost for the duration of the 168-day irrigation season.

c. What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?

Lining the canal is anticipated to eliminate the water seepage to the soil on the 600 ft project reach. Evaporation will still be present but is a fraction of the measured water loss to soil on this canal reach.

d. What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?

See above responses for the calculated water loss/savings reduction. The reduction in water loss is anticipated be over 833 ac-ft per year.

e. How will actual canal loss seepage reductions be verified?

The EBID will remeasure the upgradient and downgradient flow in the canal where the liner was placed to measure the reduction in water loss, and the new flow measurement devices at both the Carter Creek and Wilson Check structures will capture flow measurements to verify the seepage loss reductions.

f. Include a detailed description of the materials being used.

The restoration would include stripping all organic material from within the canal and reshaping the canal geometry to the desired dimensions. A consistent channel slope would be achieved by constructing a constant grade throughout the project area. The canal geometry would be reshaped to include a more consistent bottom width and 2H:1V side slopes to provide canal stability. Following these physical rehabilitations, a Huesker Canal3® liner would be installed within the canal prism.

The Huesker Canal3® liner would consist of a 20-mil composite geomembrane with 8 oz polyester nonwoven geotextile fabrics bonded to the top and bottom. This combined system allows for decreased installation efforts compared to other liner systems that require installation of multiple layers. The Canal3® liner would be installed directly on the canal bottom and canal banks. A 6-inch native soil ballast layer would be placed on top of the liner on the canal bottom to secure the liner in place and prevent floating caused by air becoming trapped under the liner and protect the liner from being damaged by wildlife traffic. The liner would extend to a height above the canal floor to provide approximately 1 foot of freeboard above the high-water level within the canal. The top edges of the liner would be keyed into the top of the banks to secure the liner on both sides. Exhibit 2 and Exhibit 3 shows the proposed placement and the canal dimensions with a typical Canal3® liner installation. Canal seepage is also evident in Exhibit 2. Seepage emanates from the north side of the canal on the bendway where the proposed liner is depicted. A discharge area is observed downslope of the canal liner reach in the exhibit.

Rehabilitation of Main Canal with Canal3® liner would significantly reduce or eliminate seepage within the 600-foot project area, providing maximum water conservation. Irrigation efficiency within the Main Canal would be substantially improved, optimizing the canal's ability to provide additional water to downstream users. The proposed lining would also significantly reduce the O&M costs associated with the canal. In addition, Huesker Canal3® has an advantage over other liner systems in that its composition of recycled materials provides an additional environmental benefit. Based on these expected results, project goals and objectives are achieved by implementing the improvements. Further, the EBID has recent experience with the Huesker Canal3® system after completing two separate lining projects upstream of this project site, which has proven to be successful by providing similar results to the current project goals. Constructing a liner consistent within two adjacent sections of the Main Canal and make installation of the canal liner within the 600-foot section relatively easy because the same construction method must be used.

(2) **Municipal Metering:** Municipal metering projects can provide water savings when individual user meters are installed where none exist to allow for unit or tiered pricing and when existing individual user meters are replaced with advanced metering infrastructure (AMI) meters. To receive credit for water savings for a municipal metering project, an applicant must provide a detailed description of the method used to estimate savings, including references to documented savings from similar previously implemented projects. Applicants proposing municipal metering projects should address the following: *N/A*

a. How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data. *N/A*
b. How have current system losses and/or the potential for reductions in water use by individual users been determined? *N/A*
c. For installing end-user water service meters, e.g., for a residential or commercial building unit., refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. In the absence of such studies, please explain in detail how expected water use reductions have been estimated and the basis for the estimations. *N/A*
d. What types (manufacturer and model) of devices will be installed and what quantity of each? *N/A*
e. How will actual water savings be verified upon completion of the project? *N/A*

(3) **Irrigation Flow Measurement:** Irrigation flow measurement improvements can provide water savings when improved measurement accuracy results in reduced spills and over- deliveries to irrigators. Applicants proposing municipal metering projects should address:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.

   See responses above for a summary of water losses and savings for the check structures and canal improvements. The total annual water lost is approximately 7,497 acre-feet (2.44 billion gallons) from the canal and cautionary spills. It is important to point out that water loss is minimized during periods of peak demand but represent an average over the water season. Wasted water represents the largest potential to conserve water. Based on the 168-day irrigation season, the total annual water loss that can be saved by automating the two structures amounts to an average of 20 cfs, 67% of the average total loss of 30 cfs, or 6,664 acre-feet (2.17 billion gallons). This water can be saved and kept in the river, reservoir, or canal system if the improvements are implemented, along with over 833 ac-ft water saved on the canal from lining.

   Have current operational losses been determined? If water savings are based on a reduction of spills, please provide support for the amount of water currently being lost to spills.

   Please see the explanation above in this section.

b. *Are flows currently measured at proposed sites and if so, what is the accuracy of existing devices? How has the existing measurement accuracy been established?*

   The EBID canal, laterals, and sub-laterals are all measured via rectangular weirs that are placed just downstream of each turnout. All the measuring devices are installed properly and are in good working condition. Thus, the accuracy of these measuring devices is likely within +/-5%. The accuracy of rectangular weirs is well documented in literature such as the USBR Water Measurement Manual.

c. Provide detailed descriptions of all proposed flow measurement devices, including accuracy and the basis for the accuracy.

Please see the explanation above in 3b. There are no required structural changes to the check structures, but the systems will be retrofitted with an automation and telemetry upgrade. The weir water level and corresponding flow data will be reported to the EBID remotely to allow them to make small adjustments in the check structure opening to optimize flow into the irrigation system. Specifically, an automated headwater elevation monitor, remote temperature sensor (both air and water sensors), an automated flow measurement device upstream of the check structure, gate position monitors, a battery bank and solar panels, an electric panel, and antenna tower for transmission of data will be used to monitor flow.

d. Will annual farm delivery volumes be reduced by more efficient and timely deliveries? If so, how has this reduction been estimated?

Yes, the annual farm delivery volumes will be reduced as the current practice is to release extra water into the system and divert more water than is necessary into the turnouts. This amount is less if assuming the canal is lined and over 833 ac-ft of water does not seep from the canal.

The proposed automation equipment will allow the EBID to dial up or dial down the flow to exactly match the required demand. The current situation only allow adjustment if there is someone to make the manual adjustment to the check structures. Demand can often change hourly and day by day. Previous check structures settings were often a conservative estimate of the future water needs, putting more water than is needed into the system and wasting the water.

The use of an automated check structure system allows the gates to be adjusted to exactly match the required demand. The amount to be saved is discussed above and equals 20 cfs, 67% of the average total loss of 30 cfs, or 6,664 acre-feet (2.17 billion gallons).

e. How will actual water savings be verified upon completion of the project?

The EBID maintains flow records for the two check structures and irrigation system and will now be able to monitor flows continuously and record changes made to the system. The water savings will be verified by the measurements taken at the check structures and subtracting out the daily flows taken at each turnout. Once the project is completed, these records will be maintained in the future to validate the proposed water conservation savings. The canal water savings will be verified by measuring the upgradient and downgradient canal flows using a handheld mechanical current/flow meter.

(4)**Turf Removal:** Applicants proposing turf removal projects should address:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data. *N/A*
b. What is the total surface area of turf to be removed and what is the estimated average annual turf consumptive use rate per unit area? *N/A*
c. Was historical water consumption data evaluated to estimate average annual turf consumptive use per unit area? If so, did the evaluation include a weather adjustment component? *N/A*
d. Will site audits be performed before applicants are accepted into the program? *N/A*
e. How will actual water savings be verified upon completion of the project? *N/A*

(5) **Smart Irrigation Controllers, Controllers with Rain Sensor Shutoff, Drip Irrigation, and High-Efficiency Nozzles**: Applicants proposing smart irrigation controllers, controllers with rain sensor shutoff, drip irrigation, or high-efficiency nozzle projects should address:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data. *N/A*
b. Was historical water consumption data evaluated to estimate the percent reduction in water demand per unit area of irrigated landscape? If so, did the evaluation include a weather adjustment component? *N/A*
c. What types (manufacturer and model) of devices will be installed and what quantity of each? *N/A*
d. Will the devices be installed through a rebate or direct-install program? *N/A*
e. Will site audits be performed before and after installation? *N/A*
f. How will actual water savings be verified upon completion of the project? *N/A*

(6) **High-Efficiency Indoor Appliances and Fixtures**: Installing high- efficiency indoor appliances and fixtures can provide water savings for municipal water entities where there is significant potential for replacing existing non-efficient indoor appliances and fixtures. Applicants proposing high-efficiency indoor appliance and fixtures projects should address:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data. *N/A*
b. What types (clothes washers, shower heads, etc.) of appliances and fixtures will be installed and what quantity of each? *N/A*
c. Have studies been conducted to verify the existence of non-efficient appliances and fixtures? Provide published water savings rates for each of these devices and reference the source for each of the device savings rates. *N/A*
d. Will the devices be installed through rebate or direct-install programs? *N/A*
e. How will actual water savings be verified upon completion of the project? *N/A*

(7) **Commercial Cooling Systems:** Cooling towers are components of many refrigeration systems with many applications. They dissipate heat to the atmosphere through the evaporative process and are common in manufacturing processes where cooling is required. They are also used for cooling large commercial buildings. Cooling

tower structures vary in size, design, and efficiency. Regardless, all cooling towers consume large volumes of water and energy. *N/A*

Open-circuit or direct contact are the most common types of cooling towers. Water is supplied to the tower after gathering heat and then released in the upper tower levels. A fan near the base of the tower creates upward airflow. Closed-circuit towers are more efficient and closed-circuit towers with adiabatic cooling are more efficient yet. *N/A*

Water and energy savings can be achieved by replacing or retrofitting older low efficiency cooling towers. Applicants proposing cooling system projects should address:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data. *N/A*
b. Was historical water consumption data evaluated to estimate the percent reduction in water demand? *N/A*
c. Specify type (manufacturer and model) of cooling tower system to be installed and/or provide a detailed description of the system retrofit plan. *N/A*

Note that an agreement will not be awarded for an improvement to conserve irrigation water unless the applicant agrees to the terms of Public Law 111-11 § 9504(a)(3)(B) (see
Section F.2.7. *Requirements for Agricultural Operations under P.L. 111-11 §9504(a)(3)(B).*

The EBID understands and agrees to the terms of Section 9504(a)(3)(B) of Public Law 111-11.

E.1.2. Evaluation Criterion B—Renewable Energy (20 points)

Up to 20 points may be awarded based on the extent to which the project increases the use of renewable energy or otherwise results in increased energy efficiency and reduced greenhouse gas emissions.

For projects that include constructing or installing renewable energy components, please respond to Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery. If the project does not implement a renewable energy project but will increase energy efficiency, please respond to Subcriterion No. B.2. Increasing Energy Efficiency in Water Management. If the project has separate components that will result in both implementing a renewable energy project and increasing energy efficiency, an applicant may respond to both.

Note: an applicant may receive points under both Subcriteria No.B.1 and B.2 if the project consists of an energy efficiency component separate from the renewable energy component of the project. However, an applicant may receive no more than 20 points total under both Subcriteria No. B.1 and B.2.

E.1.2.1. Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery

Up to 20 points may be awarded for projects that include constructing or installing renewable energy components (e.g., hydroelectric units, solar-electric facilities, wind energy systems, or facilities that otherwise enable the use of renewable energy). Projects such as small-scale solar resulting in minimal energy savings or production will be considered under Subcriterion No. B.2.

Implementing renewable energy is integrated into the installation of automated gate controls. The proposed project includes developing solar energy within the water distribution system. Rehabilitating the Carter Creek and Wilson check structures with new, automated gate controls coupled with installation of solar panels/controls will power all the necessary SCADA, servo motors and actuators to operate the gates, and telemetric equipment at each location. The remote location of each site requires a significant cost and effort to deliver grid-supplied power to each site. Remote control capabilities powered completely by solar power at each structure saves money and benefits the community through reduced greenhouse gas emissions. It is anticipated that the telemetric equipment would provide energy savings for the EBID as well as provide a fully sustainable power source for all necessary equipment.

Describe the amount of energy capacity. For projects that implement renewable energy systems, state the estimated amount of capacity (in kilowatts) of the system. Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

Installation of solar panels at each check structure to automate the gate systems will provide an overall energy savings. Traditional power alternatives were considered to determine the most feasible and cost-effective option. The cost running electrical power from the local power grid to each site is $70,000 per mile based on discussions with the local power supplier Vigilante Electric Cooperative. The nearest power to the check structures is 1.25 miles away making the total cost of grid-supplied power is over $100,000. The cost for a solar panel and battery bank at this site would be approximately $7,500. Thus, the implementation of power provided from the grid was determined to cost-prohibitive.

The amount of power use for a typical irrigation gate will consume around 5kWh per day (obtained from MET Controls). Over the course of a 168-day irrigation season, which corresponds to a total usage of 840 kWh. At an average electricity charge of 11.85 cents per kWh (www.electricchoice.com/electricity-prices-by-state/), the total cost per gate is approximately $99.54 per irrigation season. Since each of the Carter Creek and Wilson Check Structures have a single large radial gate with two hoist mechanisms (each hoist equals one standard irrigation gate usage), the total cost savings to EBID by using solar to power the gates is $398.16 per year versus the use of conventional electricity.

Describe the amount of energy generated. For projects that implement renewable energy systems, state the estimated amount of energy that the system will generate (in kilowatt hours per year). Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate. Please explain how the power generated as a result of this project will be used, including any existing or planned agreements and infrastructure.

Two identical solar panel systems are required to operate the check structure gates, one installed at each check structure. Each check structure requires about 75 kWh per month assuming a 5.6-month irrigation season (168 days) for irrigation season. To address seasonal changes in solar radiation and other possible inefficiencies, the minimum monthly power need is assumed to be 100 kWh, providing a 25 percent buffer for power generation. Based on the location of the project area, climate, cloud cover, and expected solar radiation, a 1.2 kWh solar power system is recommended to meet the 100 kWh/month demand and provide additional continency for solar to battery charging efficiency and batter degradation over time until replacement. In addition, a backup power connection will be installed at each site for a generator connection with an inverter to convert AC to DC and charge the system batteries to protect against a failure with the panels or controls. The goal is to provide a temporary power supply for O&M and repairs. Gate hand operation will also be available.

The following design parameters were used to size the system.

DC system size:	1.2 kWh
Panel / Module Type:	Premium
Array Type:	Fixed - Open Rack
System losses:	14.08
Tilt (deg):	20
Azimuth (deg)	180
Inverter efficiency	NA – DC servo motors and telemetry, no AC required

The following table shows the modeled anticipated monthly power output for each 1.2 kWh solar panel system.

Month	Solar Radiation(kWh/m2/day)	kWh
April	6.25	179
May	6.41	186
June	7.09	193
July	7.46	201
August	6.78	185
September	5.73	157
October	4.10	122

Describe the status of a mothballed hydropower plant. For projects that are brining mothballed hydropower capacity back online, please describe the following:

- Clearly describe the work that will be accomplished through the WaterSMART Grant. Note: normal OM&R activities are not eligible for funding. The work being proposed must be an investment. *N/A*

- Provide information about the capacity (in kilowatts) of the existing hydro system and the expected capacity once it is brough back on-line. ***N/A***

- Provide information about the duration that the hydro system has been offline and the reasons why it has been mothballed. Please include any regulatory reporting or filings (e.g., FERC filings) or other documentation regarding the system. ***N/A***

Describe any other benefits of the renewable energy project. Please describe and provide sufficient detail on any additional benefits expected to result from the renewable energy project, including:

- How the system will combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions

  The check structure solar benefits related to offsetting climate change impacts provides a greenhouse gas reduction of 0.656* tons/year of CO_2. The reduction assumes the solar power system described above is installed at the two check structure sites. It also assumes the EBID will not purchase 840 kWh/year from the grid to operate the check structures. While the check structure tonnage and carbon footprint of the project is small, the proposed solar power systems provide a significant cost savings using renewable energy over traditional grid electrical services and a quantifiable reduction in greenhouse gases can be realized. The proposed project shows that small reductions in greenhouse gas emissions can add up to significant changes if more water delivery systems are converted to renewable energy.

  *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

- Expected environmental benefits of the renewable energy system

  The proposed renewable energy systems will have a direct environmental benefit reducing greenhouse gas emissions as described above. Another direct benefit is the automation and renewable energy systems require reduced travel to and from the sites, which lowers greenhouse gas emissions because fewer visits are required to operate the system.

  Currently, multiple trips are required each day to manually operate the two check structures. The automated systems will ensure the EBID uses less fuel to operate the structures, reducing vehicle greenhouse gas emissions. The EBID personal drive to the sites multiple times each day totaling 50 miles/day on average in a heavy-duty truck that gets about 12 mpg. By reducing travel, the expected greenhouse gas emissions reduction is 3.9* tons/year of CO_2, far exceeding the reduction described above for solar power renewable energy. The calculated reduction is based on the automated system requiring only one day of travel per week (50 miles) vs. every workday to manually operate the system during the 24-week irrigation season (200 more miles driven per week x 24 weeks = 4,800 miles more miles per season to manually operate the check structures). The total greenhouse gas emissions reduction is 4.556 tons/year between using the solar array systems above and reducing travel by 80 percent to and from the check structure sites.

Collateral environmental benefits of the renewable energy project are water quality improvements described earlier for sediment, nutrients, and water temperature.

- Any expected reduction in the use of energy currently supplied through a Reclamation project.

N/A

- Anticipated benefits to other sectors/entities.

The proposed project and renewable energy components will have a beneficial impact on the local economy by furnishing short-term work during construction of the project and long-term allotments for sustainable agricultural production. Sustaining agricultural production and increasing ag-driven revenue generation are crucial to maintaining rural communities in Montana. All the EBID users rely heavily on ag-based commerce. The proposed project will protect the source and supply of water supply to the canal system to preserve the agricultural crops and revenue through automation. The protection of this revenue generated by the project will tie back into the local economy by way of commercial trucking, local implement dealers, and local businesses. The project will also prevent significant revenue losses to water users in typical annual revenue by providing a consistent flow of water for irrigation and not wasting water. Consistent flows from the proposed project will facilitate improved crop production, increase revenues to producers, and stimulate the local and regional economies. The EBID water users primarily grow alfalfa hay, grass hay, and potatoes. Discussions with local growers within the area indicate that the locally grown crops will be distributed throughout the State of Montana. Increases in crop production will have a direct impact on a statewide basis, as the crops produced are used throughout the State and contribute to the local and state tax bases from increased revenues.

The proposed rehabilitation project will provide significant financial, safety, and operational improvements to the EBID water users. The proposed automation will provide a safer work environment with new, state-of-the-art components that will alleviate many of the existing operational issues and reduce the chance that employees will be placed in harm's way. The proposed rehabilitation project will significantly reduce the amount of time that the EBID spends on operation and maintenance, allowing them to focus on other improvements and operations within the other parts of the system that need their attention. Additional local benefits include boosting the local economy through workers, material suppliers, truckers, and other temporary workers contributing to local stores, restaurants, and gas stations during construction of the proposed project.

While the renewable energy components of the project are small cost-wise, the use of traditional grid power significantly increase the cost of the project making it cost prohibitive and the system may continue to be manually operated. The solar power and battery system are key to making the project financially viable and realize the economic benefits described above.

- Expected water needs, if any, of the system.

N/A

AND/OR

E.1.2.2. Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

Up to 10 points may be awarded for projects that address energy demands and reduce greenhouse gas emissions by retrofitting equipment to increase energy efficiency and/or through water conservation improvements that result in reduced pumping or diversions.

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water efficiency project (e.g., reduced pumping).

- If quantifiable energy savings is expected to result from the project, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.

N/A

- How will the energy efficiency improvement combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions.

N/A

- If the project will result in reduced pumping, please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements and energy usage?

N/A

- Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.

N/A

- Does the calculation include any energy required to treat the water, if applicable?

N/A

- Will the project result in reduced vehicle miles driven, in turn reducing greenhouse gas emissions? Please provide supporting details and calculations.

  Yes, see above. The expected greenhouse gas emissions reduction is 3.9* tons/year of CO2 from reduced vehicle mileage. The calculated reduction is based on the automated system requiring only one day of travel per week (50 miles) vs. every workday to manually operate the system during the 24-week irrigation season (200 more miles per week x 24 weeks = 4,800 miles more miles per season to manually operate the check structures). The EBID personal currently drive to the sites multiple times each day totaling 50 miles/day on average in a heavy-duty truck that gets about 12 mpg.

  Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).

  Implementing small scale renewable energy is integrated into the installation of automated gate controls. The proposed project includes developing solar energy to help manage the water distribution system. Rehabilitating the Carter Creek and Wilson Check Structures with new, automated gate controls coupled with installation of solar panels that will energize all the necessary SCADA, servo motors needed to operate the gates, and telemetric equipment at each location. Remote control capabilities powered completely by solar power at each structure greatly benefit the EBID and reduce greenhouse gas emissions as described earlier. It is anticipated that the telemetric equipment would provide a small energy savings, especially considering the capital costs for grid power, for the EBID. The solar provide a fully sustainable power source for all necessary equipment and operations.

  The amount of power is about 5kWh per day (obtained from MET Controls). Over the course of a 168-day irrigation season, which corresponds to a total usage of 840 kWh. At an average electricity charge of 11.85 cents per kWh (www.electricchoice.com/electricity-prices-by-state/), the total cost per gate is approximately $99.54 per irrigation season. Since each of the Carter Creek and Wilson Check Structures have one large radial gate with two hoist mechanisms (each hoist equals one standard irrigation gate usage), the total cost savings to EBID by using solar to power the gates is $398.16 per year versus the use of conventional electricity. A small but significant savings over time.

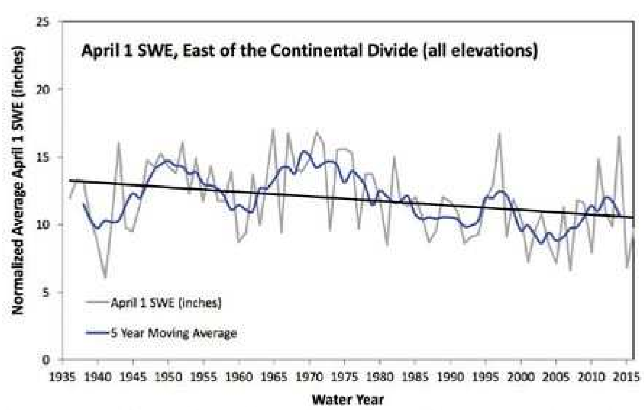
  Two solar panel systems are required to operate the check structure gates and identical solar power systems at each check structure are proposed. Each check structure requires about 75 kWh per month assuming a 24 week- or 5.6 month-long season for irrigation. To address seasonal changes in solar radiation and other possible inefficiencies, the minimum monthly power need is assumed to be 100 kWh, providing a 25 percent buffer for power generation. Based on the location of the project area, climate, cloud cover, and expected solar radiation, a 1.2 kWh solar power system is recommended to meet the 100 kWh/month demand and provide additional continency for solar to battery charging efficiency and batter degradation over time until replacement.

E.1.3. Evaluation Criterion C—Sustainability Benefits (20 points)

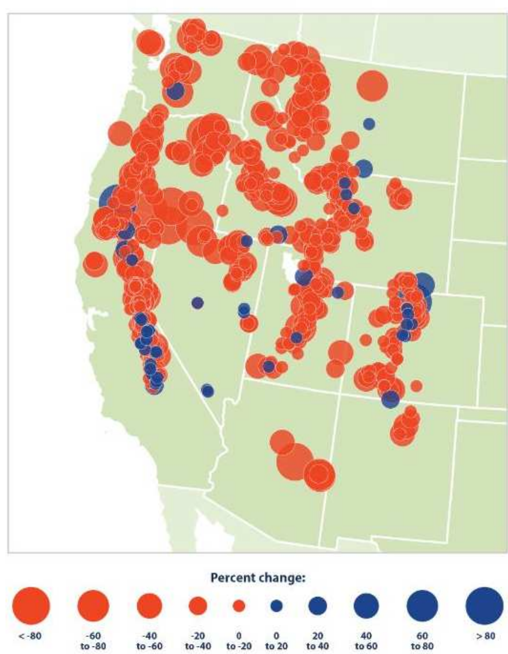
*Up to **20 points** may be awarded under this criterion. This criterion prioritizes projects that address a specific water and/or energy sustainability concern(s), including enhancing drought resilience, addressing the current and future impacts of climate change, and resolving water related conflicts in the region. In addition, this criterion is focused on the benefits associated with the project, including benefits to tribes, ecosystem benefits, and other benefits to water and/or energy supply sustainability.*

Enhancing drought resiliency. In addition to the separate WaterSMART Environmental Water Resources Projects NOFO, this NOFO places a priority on projects that enhance drought resiliency, through this section and other sections above, consistent with the SECURE Water Act. Please provide information regarding how the project will enhance drought resilience by benefitting the water supply and ecosystem, including the following:

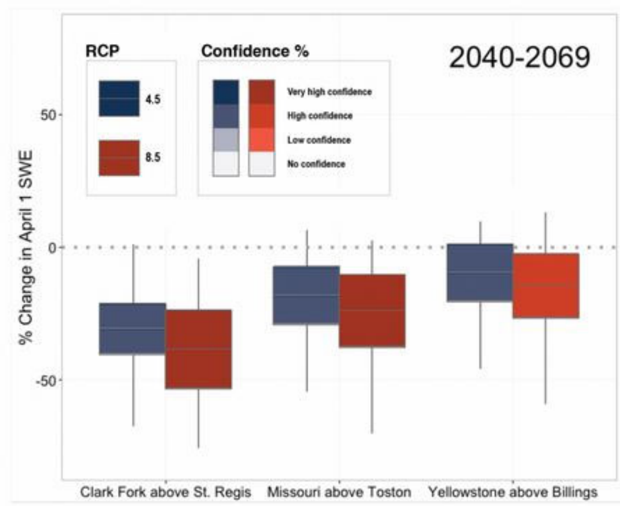
Water is in southwest Montana is a limited resource and climate change and associated drought have resulted is less water on average available from snowmelt to fill and store in Clark Canyon Reservoir. Snowpack east of the continental divide in Montana has on average decreased about two inches of snow water equivariant (SWE) between 1935 and 2015. Less water was available over time to store and irrigate Clark Canyon Reservoir, according the to the 2017 Montana Climate Change Assessment (Chapter 3, https://montanaclimate.org/chapter/water). Specifically, the assessment states change in snowpack and runoff timing will likely increase the frequency and duration of drought during late summer and early fall going forward as shown below.



Trends in April Snowpack in the Western US, 1955-2016



Montana SWE snowpack trend 1935 to 2015 east of the continental divide and SWE snowpack in the western US 1955 to 2016 *(https://montanaclimate.org/chapter/water)*



The Montana Climate Change Assessment Report projected future April 1 SWE changes in three snowmelt-dominated basins in Montana, including the Missouri River Basin above Toston where the EBID project is located. Projections consist of two future scenarios described in the assessment for greenhouse gas emissions termed Representative Concentration Pathways (RCP). The 2040-2069 SWE projected changes are included here for reference. Modeled results were compared to a historical baseline period of 1970-2000. The projections highlight the general direction of SWE changes and differences among watersheds across the state. Values near the dotted 0% line represent model results that project no future change in snowpack relative to 1970-2000 data. The results demonstrate relatively strong agreement among most of the climate models and show the direction of change, but not specific future snowpack volumes. The upper Missouri River basin shows a marked decrease in projected SWE based on both future greenhouse gas emission RCP scenarios, which will likely impact the EBID.

Conserving water through efficiency improvements in the EBID system is clearly an important goal and necessity to combat climate change and drought. The Carter Creek Lining and Check Structures Automation Project will provide substantial water delivery efficiency improvements throughout the entire EBID system. The proposed project will allow the EBID staff to remotely monitor main canal flows and correlate water levels in the canal to match system demands. The proposed project will allow the EBID to conserve 7,497 acre-feet (2.44 billion gallons) of water. Based on an allowable water right of 510 cfs, this would equate to a very conservative 4.41% increase in water that is directly available to the EBID for use. Delaying the release of the 7,497 acre-feet of water conserved earlier in the irrigation season (storage in Clark Canyon Reservoir), equates to an additional 3.6 inches of water that the irrigators could apply to their crops to further crop development for the entire 25,000 acres in the EBID system. This 3.6-inch increase represents a 4.41% increase in water provided to the entire system which is anticipated to correlate to a 4.41% increase in crop production for 25,000 acres.

In addition, the EBID may be able to contract additional service areas to provide water for crop production. The EBID service area covers approximately 28,000 acres, which is larger than the 25,000 acres currently being serviced. The EBID has the right to extend service contracts to additional acres within their service area. The additional water conserved by this project can be used to supplement additional acres within the EBID's service area.

The proposed lining and check structure improvements clearly benefit the water supply and add drought resiliency to EBID agricultural operations. Currently water is wasted through cautionary spills and a leaking canal. Implementing the improvements significantly reduces the water wasted through automation and eliminates water losses by lining the canal. Ongoing drought in southwest Montana is projects and the EBID is proposing this project to improvement system resiliency to protect against drought.

- Does the project seek to improve ecological resiliency to climate change?

  Currently, the inability to control the water levels using the Carter Creek and Wilson Check Structures is causing variable flow conditions within the EBID canal and lateral delivery system. With soils that are highly susceptible to erosion, the flow conditions create sediment that discharges to the Ruby and Beaverhead Rivers which negatively impacts fish and wildlife habitat. The lack of flow control within the system results in the EBID delivering more water into their system than is necessary to ensure delivery to all users. This excess flow takes water away from the Beaverhead River during certain times of the year and negatively impacts fish and wildlife as a result. The proposed Carter Creek Lining and Check Structures Automation Project will reduce erosion and conserve water within the EBID system to the benefit of fish and wildlife habitats and populations. In addition, ecological improvements are linked to less nutrients and high temperature water flowing into the two rivers. Cleaner water will be discharged to these rivers improving fish habitat as well as other aquatic and riparian species.

  One of the prominent projects of climate change is that climate change continues to impact Montana watersheds where winter months are shortened and runoff tends to occur earlier than it did in the previous decades (documented in the 2017 Montana Climate Assessment, *https://montanaclimate.org/*). When early runoff happens, river flows decrease earlier than previously and water rationing within irrigation districts becomes more prevalent as river flows drop off going into the hotter summer months of July, August, and September. The EBID efficiency improvement is part of their primary defense against drought and climate change. As the EBID becomes more efficient, more water is available to the water users to reduce the impacts of water rationing due to drought. Although water rationing will not be completely avoided, the more water that is saved will result in less water rationing that has to occur and keep more water in the Clark Canyon Reservoir or the Beaverhead River outside of periods of peak irrigation demand. This project will protect and improve the ecological resiliency needed to counter climate change.

- Will water remain in the system for longer periods of time? If so, provide details on current/future durations and any expected resulting benefits (e.g., maintaining water temperatures or water levels).

  No. In general, there is little or no change in how long water remains in the EBID system. However, less water is required to operate the EBID assuming the proposed water efficiently improvements are implemented. Less water in the system means less will remain in the system because there are fewer cautionary spills and canal leakage. Water not used will be stored in Clark Canyon Reservoir or discharged to the Beaverhead River for future use, downstream irrigation, and flow augmentation in the Beaverhead River that benefits the ecosystem. Specifically, keeping water in Clark Canyon Reservoir and the Beaverhead River benefits aquatic resources, the fishery, and downstream water uses below Beaverhead Canyon and spends not time in the EBID.

Wasted water and canal leakage that recharge and enters the local groundwater system is reduced by implementing the proposed project. Currently, water lost to the groundwater system remains out of the river and basin surface water system for a long period of time, estimated in the months due to groundwater velocity and the four-mile distance from the check structures and Beaverhead River. Eliminating the water loss to groundwater ensures EBID water will spend less time delayed by the irrigation system because the water is not used, stored in the reservoir, or released to the Beaverhead River.

- Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project or is subject to a recovery plan or conservation plan under the Endangered Species Act (ESA).

The proposed project will provide water conservation benefits that can be left in the Beaverhead River and Clark Canyon Reservoir outside of peak irrigation demand periods. The additional water will benefit the reservoir and river ecology by increasing flows or level and leaving cleaner water in the river system to support fish and wildlife habitat. There are no endangered species that benefit from proposed project in the upper Missouri River Basin. However, recreational fishery benefits are likely and important to the local economy. Reduced Brown Trout population is currently an issue in the upper Missouri headwaters according to Montana Fish, Wildlife and Parks. The cause of the Brown Trout population decline is undetermined but providing more and cleaner water to the Beaverhead River is likely going to benefit the recreational fishery and species.

Native Westslope Cutthroat Trout are native to the Beaverhead watershed and currently ranked "S2" in Montana because the species is at risk due to very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to extirpation in the state (source: https://fieldguide.mt.gov/speciesDetail.aspx?elcode=AFCHA02088). The species is not currently observed and mapped as not present in the main stem of Beaverhead and Ruby Rivers, and while the species is not listed, it may be threatened (https://myfwp.mt.gov/getRepositoryFile?objectID=91691).

Please describe any other ecosystem benefits as a direct result of the project.

This project will improve water quality in the Ruby and Beaverhead Rivers as a result of reduced irrigation flows from the EBID's delivery system. The Ruby

River from Ruby Dam to the Beaverhead River has documented impacts from total phosphorous. The river was first listed in 2006 for total phosphorous. The river is listed as use class B-1, water quality category 5 and is a low priority for phosphorous. The Beaverhead River from Clark Canyon Dam to the Jefferson River has documented impacts from total nitrogen and total phosphorous. The river was first listed in 2018 for total nitrogen and total phosphorous. The river is listed as use class B-1, water quality category 5 and is a low priority for nitrogen and phosphorous. Fertilizer containing nitrogen and phosphorous is a common practice on agricultural fields. The irrigation of these fields leads to high concentrations of these nutrients to return to the canal system, which discharges directly into the Ruby River and the Beaverhead River, depending on the location within the EBID. Temperature is also important, as warmer temperatures create toxic conditions for fish and wildlife and facilitate toxic algal blooms. Nutrient concentrations and water temperature may increase significantly in the EBID main canal which runs nearly 40 miles from the diversion. The proposed project will allow the EBID to control flows more precisely and minimize return flows to the Ruby and Beaverhead Rivers, thereby assisting in the reduction of temperature and nutrient impacts.

Sediment will also be reduced in return flows. Using Schoklitsch's equation, approximately 192 cubic yards of sediment over the 168-day irrigation season is discharged from the EBID delivery system back to the Beaverhead and Ruby River. Through the implementation of the gate automation and canal lining project, the erosion and sediment loading will be minimized by up to 192 cubic yards per year for the 30-year design life of the proposed project and potentially longer. Reducing sediment and nutrient concentrations in the EBID system through improved water delivery efficiency and conserving water, water quality will be improved in the rivers. Cleaner water will help protect fish habitat as well as other aquatic and riparian species. Flow readings at various locations will be used by EBID staff to monitor, quantify, and record flows within the EBID system.

Will the project directly result in more efficient management of the water supply? For example, will the project provide greater flexibility to water managers, resulting in a more efficient use of water supplies?

Yes, one of the primary goals of the proposed project that is related to automating the two check structures is to provide greater flexibility for EBID water managers to more efficiency use available water. Throughout this grant application, the text outlines improved water efficiency and water management. Specifically, automating the check structure gates and lining a portion of the main canal will increase the delivery efficiency of the irrigation system and conserve water through improved operation and efficiency of the check structures and main canal system.

The improvements facilitate an ability to divert back to the Beaverhead River during non-peak use, water remaining longer in storage in Clark Canyon Dam, and ensuring more precise control of water being diverted from the EBID Main

Canal to water users. The project eliminates the age-old practice of diverting extra water and wasting it if not used. Higher efficiency will increase crop production by providing adequate water during critical growth periods. The more water available for use will further enhance the EBID's ability to contract with other entities for industrial or agricultural water use. The rehabilitation project will allow the EBID to continue looking for water development opportunities. Alternatively, more water stored or released from the reservoir benefits the two ecosystems in terms of water quality and quantity.

Projects that are intended to improve streamflows or aquatic habit, and that are requesting $500,000 or more in Federal funding, must include information about plans to monitor the benefits of the project. Please describe the plan to monitor improved streamflows or aquatic habit benefits over a five-year period once the project has been completed. Provide detail on the steps to be taken to carry out the plan.

The proposed project will not be requesting $500,000 or more in Federal funding. However, the EBID currently monitors flow within their irrigation system as well as water in the Beaverhead River on a constant basis. These records will continue to be kept following the proposed rehabilitation to track the improvements in water efficiency and improved streamflow that will occur outside periods of peak irrigation demand when the EBID to exercise their full water right.

Addressing a specific water and/or energy sustainability concern(s). Will the project address a specific sustainability concern? Please address the following:

- Explain and provide detail of the specific issue(s) in the area that is impacting water sustainability, such as shortages due to drought and/or climate change, increased demand, or reduced deliveries.

Water shortages related to climate change and the associated drought in southwest Montana is well supported in long-term climate data and the associated impact of less available water during the irrigation season is a threat to sustainable agriculture. Some of the important projected impacts of climate change is that it will continue to impact Montana watersheds reducing late winter snowpack SWE, winter months will be shorter, and runoff will tend to happen earlier in the spring than it did in the previous decades (documented in the 2017 Montana Climate Assessment, https://montanaclimate.org/). When this happens, river flows fall off earlier than previously and water rationing within irrigation districts becomes more prevalent as river flows drop off going into the hotter summer months of July, August, and September.

The impacts to water supply availability due to climate change has been documented in the 2017 Montana Climate Assessment, (https://montanaclimate.org/). Based on this report, there are several major findings that include:

- Montana's snowpack has declined over the observational record, since the 1930s.

- Continued warming temperatures will reduce snowpack at mid and low elevations.
- Historical observations show a shift toward earlier snowmelt and an earlier peak in spring runoff.
- Earlier onset of snowmelt and spring runoff will reduce late-summer water availability.
- Multi-year and decadal-scale droughts have been and will continue to be a natural feature of Montana's climate.
- Changes in snowpack and runoff timing will likely increase the frequency and duration of drought during late summer and early fall.

- Explain and provide detail of the specific issue(s) in the area that is impacting energy sustainability, such as reliance on fossil fuels, pollution, or interruptions in service.

The proposed project includes green/renewable energy development and sustainable agriculture improvements that benefits the project and serve as an example for community climate resilience. This project will not only save precious water that can be used to help mitigate downstream water rationing but will also utilize solar and battery backup power to operate the two check structures, SCADA, and telemetry systems. Energy sustainability is a concern in all of Montana as the state braces for the eventual shutdown of the Colstrip coal-fired power station. The Colstrip power station is a major source of power throughout the West, and its eventual shutdown may cause power outages, especially during periods of peak demand in the late summer when temperatures are high, which also corresponds to peak irrigation demand. The EBID project will use renewable energy to ensure a sustainable project, eliminate dependance on the grid, lesson greenhouse gas emissions, and lower the reliance on fossil fuels for travel and water management.

- Please describe how the project will directly address the concern(s) stated above. For example, if experiencing shortages due to drought or climate change, how will the project directly address and confront the shortages?

The EBID has focused on irrigation efficiency as their primary defense against drought and climate change. As the EBID system becomes more efficient, more water is available to deliver to water users, which reduces the impacts of water rationing due to drought, climate change, and late water availably because senior water right holders call on water. Although water rationing will not be completely avoided in dry years, the more water saved will result in less water rationing, which will help support the local agricultural sector and economy. This proposed project will save water consistently and leave more water in the river for downstream use and will protect against water rationing due to drought and/or climate change. As outlined in many places in this grant application, the improvements produce a quantifiable water savings from less cautionary spills and lining the canal. The EBID will be able to better manage and conserve water in dry years by properly adjusting canal head to laterals, allowing them to maximize crop production through improved water allocation, adjusting flows at the proper time for plant growth and harvesting, and potentially increase crop production in wet years in new areas. Lastly, the proposed gate operation, SCADA, and telemetry systems will utilize solar panels with a battery bank as the primary energy source, thus eliminating the reliance on the energy grid.

- Please address where any conserved water as a result of the project will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.

The proposed project will provide water conservation benefits that can be left in Clark Canyon Reservoir for use later in the irrigation season or the water will be released into the Beaverhead River outside of peak irrigation demand periods. During periods of peak irrigation demand, the EBID can experience water shortages due to a lack of available stored water, especially during periods in the late summer months when the reservoir is dewatered, and senior water rights holders can call for water. The water saved during these periods will be most likely benefit the Beaverhead River, providing higher flow in the canyon below the reservoir and benefiting the fishery. Water will also be more likely further downstream for users in the river system, which benefits senior water rights holder.

- Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.

Real-time water measurements data gathered from the check structures will be used to open or close the gate systems to better manage water delivery and make real-time decisions on water diversion affecting the entire system. The unused water is either stored in the Clark Canyon Reservoir or released to the Beaverhead River to alleviate water demands further downstream in the EBID system. Any and all saved water from this proposed project and other conservation projects in the watershed will be used for its intended purposes. There is no excess water in the Upper Missouri River Basin during the irrigation season, except during rare periods and events of exceptionally high runoff. In general, the watershed is overallocated and the legal demand for water exceeds the physical availability of irrigation water, which is exacerbated by drought and climate change. Even during periods of exceptionally high runoff, excess water is either stored in reservoirs locally or downstream, or water is used for navigation purposes much further downstream.

- Indicate the quantity of conserved water that will be used for the intended purpose(s).

Significant water savings are realized by implementing the proposed improvements. The improvements reduce cautionary spill volume and eliminates seepage from the main canal system through installation of canal liner. Implementation of these improvements will conserve a total of 7,497 acre-feet, or 2.44 billion gallons of water annually.

Cautionary/Excess Water Spills

Based on EBID operation records and conversations with experienced EBID ditch riders, the Carter Creek and Wilson Check Structures have cautionary waste spills of 30 cfs on average related to excess water. The total cautionary waste spill amounts to 3.25 billion gallons of water annually that is wasted during the 168-day irrigation season. Although some of the excess water discharges back into the Beaverhead and Ruby Rivers from downstream wasteways, wasted water results in excessive seepage, evapotranspiration losses, and causes erosion in the main canal. In addition, downstream wasteways lead to excessive sediment loading within the canal system, which impacts water quality in the Beaverhead and Ruby Rivers, depending on the location within the canal system. Based on the WWC field visit and conversations with EBID personnel, approximately 33% of the cautionary waste flows returns to the Beaverhead River each year and 67% is lost to typical canal losses related to seepage and evapotranspiration, some of which also flows into the Ruby River. The cautionary waste spills are discharged into Humphrey's Gulch (Wilson Check) and Carter Creek, which are both more than 4 miles from the Beaverhead River. Both drainages consist of sandy soils that are highly permeable, both drainages have stock ponds on the stream, and both drainages have large cross sections and low gradients that exacerbate and increase water loss.

Rehabilitation of the Wilson and Carter Creek Check Structure will conserve 20 cfs of the to 30 cfs of cautionary spills. A net savings of 20 cfs results in approximately 2.17 billion gallons (6,664 acre-feet) of water conserved annually. EBID will keep water measurement records to monitor and track of the conservation benefit that will come from automation of the Carter Creek and Wilson Check Structures.

Canal Seepage

The 600-foot section of the main canal leading up to the Carter Creek siphon was measured by EBID personnel in 2021 due to concerns over seepage losses in this section of the canal. The results indicated a loss of 2.5 cfs, which was verified by calculations performed by WWC Engineering. Thus, lining the 600-foot section of the main canal will save 2.5 cfs over the entire 168-day irrigation season, saving 833 acre-feet (271 million gallons).

Other project benefits. Please provide a detailed explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

(1) **Combating the Climate Crisis:** E.O. 14008: "Tackling the Climate Crisis at Home and Abroad", focuses on increasing resilience to climate change and supporting climate- resilient development. For additional information on the impacts of climate change throughout the western United States, see: https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREReport.pdf. Please describe how the project will address climate change, including:

- Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.

The best way to combat climate change is to lead by example and specifically decrease the size of the carbon footprint for implementation and project sustainability. Leading by example helps others understand the challenges climate change placed on the local community and provides financial and ecological reasons to pursue, for example, solar power instead of traditional grid supplied power.

The check structure project offsets climate change impacts from a reduction in greenhouse gases of 0.656* tons/year of CO_2. The reduction assumes a solar system (described earlier in the grant) is installed at the two check structure sites. It also assumes the EBID will not purchase 840 kWh/year from the grid to operate the check structures. While the check structure tonnage and carbon footprint are relatively small, the proposed solar power systems provide a significant cost savings using renewable energy over traditional grid electrical services and that a quantifiable reduction in greenhouse gases can be realized at this scale. The proposed project shows that small reductions in greenhouse gas emissions can add up to significant changes if more water delivery systems are converted to renewable energy.

Another direct benefit is the renewable energy systems require a reduced the amount of travel to and from the sites, which lowers greenhouse gas emissions because fewer visits are required to operate the system. Currently, multiple trips are required each day to manually operate the two check structures. The automated systems will ensure the EBID uses less fuel to operate the structures, reducing vehicle greenhouse gas emissions. The EBID personal drive to the sites multiple times each day totaling 50 miles/day on average in a heavy-duty truck that gets about 12 mpg. By reducing travel, the expected greenhouse gas emissions reduction is 3.9* tons/year of CO_2, far exceeding the reduction described above for solar power renewable energy. The calculated reduction is based on the automated system requiring only one day of travel per week (50 miles) vs. every workday to manually operate the system during the 24-week irrigation season (200 more miles driven per week x 24 weeks = 4,800 miles more miles per season to manually operate the check structures). The total greenhouse gas emissions reduction is 4.556 tons/year between using the solar array systems above and reducing travel by 80 percent to and from the check structure sites.

The reduction in greenhouse gasses serve as examples that benefit the local community and provide an alternative to traditional power connection for not only water management projects, but all projects in the region. The EBID will promote and outline the costs and benefits of this project in regular meetings as well as in public-at-large events.

- Does this proposed project strengthen water supply sustainability to increase resilience to climate change?

  Yes, using less water will allow the water to remain in storage for use later during the irrigation season or allow the water to be released for flow augmentation in the Beaverhead River and used further downstream. The water efficiency improvements related to reducing the cautionary spill volume and eliminating seepage from the main canal save water, which is in turn is not routed through the EBID system. More flexibility in how the water is used because there is more water to manage helps strengthen water supply sustainability. It also increases the systems resilience to climate change impacts related to a smaller average snowpack, early runoff from higher temperatures, and late season water demands during dry years.

  Specifically, the snowpack east of the continental divide in Montana has on average decreased about two inches of SWE between 1935 and 2015, establishing less water was available over time to store and irrigate, according the to the 2017 Montana Climate Change Assessment report. The assessment states change in snowpack and runoff timing will likely increase the frequency and duration of drought during late summer and early fall going forward as discussed earlier in the grant application. Competition for water will increase as the trend continues. To ensure a sustainable EBID water delivery system, improvements are needed to maximize efficiency and reduce competition for a limited water supply.

- Will the proposed project establish and utilize a renewable energy source?

  Yes, the proposed project includes renewable energy development that benefits the project and serves as an example for community climate change resilience. This project will not only save precious water that can be used to help mitigate downstream water needs and rationing but will also utilize solar and battery backup power to operate the two check structures, SCADA, and telemetry systems. Energy sustainability is a concern in all of Montana as the state braces for the eventual shutdown of the Colstrip coal-fired power station. The Colstrip power station is a major source of power throughout the West, and its eventual shutdown may cause power outages, especially during periods of peak demand in the late summer when temperatures are high, which also corresponds to peak irrigation demand. The EBID project will use renewable energy to ensure a sustainable project, eliminate dependance on the grid, lesson greenhouse gas emissions, and lower the reliance on fossil fuels for travel and water management. Engineering details for the proposed renewable energy installation and benefits are described earlier and thorough this grant application.

- Will the project result in lower greenhouse gas emissions?

  Yes, see the discussion three bullets above this question quantifying how the proposed project reduces greenhouse gas emissions. Another way this project will reduce greenhouse gas emissions is increasing crop production which creates more vegetation and sequesters carbon. While the reduction is not easily quantitated like less travel and a solar power development, it provides an added reduction to CO_2.

(2) **Disadvantaged or Underserved Communities**: E.O. 14008 and E.O. 13985 support environmental and economic justice by investing in underserved and disadvantaged communities and addressing the climate-related impacts to these communities, including impacts to public health, safety, and economic opportunities. Please describe how the project supports these Executive Orders, including:

a. Does the proposed project directly serve and/or benefit a disadvantaged or historically underserved community? Benefits can include but are not limited to: public health and safety through water quality improvements, new water supplies, new renewable energy sources, or economic growth opportunities. *N/A*

b. If the proposed project is providing benefits to a disadvantaged community, provide sufficient information to demonstrate that the community meets the disadvantaged community definition in Section 1015 of the Cooperative Watershed Act, which is defined as a community with an annual median household income that is less than 100 percent of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status. *N/A*

c. If the proposed project is providing benefits to an underserved community, provide sufficient information to demonstrate that the community meets the underserved definition in E.O. 13985, which includes populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. *N/A*

(3) **Tribal Benefits:** The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal trust responsibilities. The President's memorandum "Tribal Consultation and Strengthening Nation-to-Nation Relationships" asserts the importance of honoring the Federal government's commitments to Tribal Nations. Please address the following, if applicable:

a. Does the proposed project directly serve and/or benefit a Tribe? Will the project increase water supply sustainability for an Indian Tribe? Will the project provide renewable energy for an Indian Tribe? *N/A*

b. Does the proposed project directly support tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety through water quality improvements, new water supplies, or economic growth opportunities? *N/A*

(4) Other Benefits: Will the project address water and/or energy sustainability in other ways not described above? For example:

a. Will the project assist States and water users in complying with interstate compacts?

The proposed project will provide water conservation that can be used to assist in complying with the Missouri Headwaters Basin Study (August 2021).

https://leg.mt.gov/content/Committees/Interim/2021-2022/Water-Policy/Oct2021/MissouriHeadwaters_BasinStudy_ExecutiveSummary.pdf

The study recommends storing additional water in Clark Canyon Reservoir to decrease drawdown for flood storage and increase end of water year storage in dry years. The also state there would be little impact on winter streamflow in the Beaverhead River downstream of Clark Canyon Reservoir, even in dry years.

b. Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?

The proposed project will provide water via conservation that can be used for agriculture, downstream industrial use, environmental uses such as the preservation of fish and wildlife habitat, and to facilitate recreation and navigation in the Missouri River.

c. Will the project benefit a larger initiative to address sustainability?

The proposed project is one of the first in a series of planned projects by the EBID to modernize their irrigation system and make it more efficient to address the sustainability of the water supply. The EBID boards understands water in southwest Montana is a limited resource, and climate change and drought will continue to take a toll on water delivery unless improvement are made to use water more efficiently. The more water that can be saved within the system will allow the EBID to reduce and minimize the overall impact of drought conditions.

d. Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?

Yes, from a water rights and seniority perspective. The EBID does not benefit from a senior water rights position for all stored water, and they do not have access to decreed instream flow water rights on the Beaverhead River. During dry periods associated with drought, stored water can and has been reduced or shutoff early to the EBID because senior water rights holders and senior stored water rights called on water. The ability to provide stored water to the EBID also depends on snowpack and Clark Canyon Reservoir pool elevation.

Shutting off or reducing water to such a large and productive agricultural area pits EBID water users against each other competing for the water and other basin water rights holder with or without seniority. Developing ways to use available water more efficiently can quell the crisis and conflict during drought and low reservoir pool elevation.

Shutting down or reducing the EBID is also a significant economic impact to the area. To size up the economic impact, just the proposed improvements for Carter Creek lining and check structures automation will provide substantial water delivery efficiency improvements and economic gains. The EBID will be able to conserve approximately 7,497 acre-feet (2.44 billion gallons) resulting in 3.6 inches of additional water provided each year to 25,000 irrigated acres. This 3.6-inch increase represents a 4.41% increase in water provided to the entire system which is anticipated to correlate to a 4.41% increase in crop production for 25,000 acres. The boost to crop productions will result in a $1,171,379 annual increase in agricultural revenue for the area and a present worth value of $23,201,808 improvement over current conditions over the 30-year design life of the project.

Total annual crop production is estimated at $26,561,882 and shutting down or diminishing crop production on the EBID will result in significant economic hardships for landowners and increased tension between producers who rely on stored water from Clark Canyon Reservoir.

E.1.4. Evaluation Criterion D—Complementing On-Farm Irrigation Improvements (10 points)

Up to 10 points may be awarded for projects that describe in detail how they will complement on-farm irrigation improvements eligible for NRCS financial or technical assistance.

Note: Scoring under this criterion is based on an overall assessment of the extent to which the WaterSMART Grant project will complement ongoing or future on-farm improvements.

Applicants should describe any proposal made to NRCS, or any plans to seek assistance from NRCS in the future, and how an NRCS-assisted activity would complement the WaterSMART Grant project. Financial assistance through EQIP is the most commonly used program by which NRCS helps producers implement improvements to irrigation systems, but NRCS does have additional technical or financial assistance programs that may be available. Applicants may receive maximum points under this criterion by providing the information described in the bullet points below. Applicants are not required to have assurances of NRCS assistance by the application deadline to be awarded the maximum number of points under this sub- criterion. Reclamation may contact applicants during the review process to gather additional information about pending applications for NRCS assistance if necessary.

Please note: On-farm improvements themselves are not eligible activities for funding under

NRCS will have a separate application process for the on-farm components of selected projects that may be undertaken in the future, separate of the WaterSMART Grant project.

If the proposed project will complement an on-farm improvement eligible for NRCS assistance, please address the following:

- Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies.
  - Provide a detailed description of the on-farm efficiency improvements.

    The EBID project provides water to approximately 25,000 acres for irrigation to over 159 water users. Many of the farmers/ranchers within the project have applied for and have received EQIP funding for pivots and other on-farm conservation improvements. The EBID currently has no farmers who are working with the local NRCS to put in on-farm improvements. However, several farmers have taken advantage of the NRCS EQIP program in the past to install center pivots on lands served by the EBID and many of the farmers within the EBID are open to potential support through NRCS programs.

  - Have the farmers requested technical or financial assistance from NRCS for the on- farm efficiency projects, or do they plan to in the future?

    The farmers typically request technical and financial assistance from the NRCS for their on-farm efficiency projects. The local NRCS either performs the technical assistance with in-house staff or utilizes Technical Service Providers. We are not aware of any request for technical or financial assistance from the NRCS at the present time, but the EBID users remain open to potential support through NRCS programs.

  - If available, provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs.

    After speaking and briefing Mr. Shawn Lewis about this project (July 18, 2022), the local NRCS District Conservationist in Dillon, past projects involving the construction of pressurized pipelines and center pivots have been completed through assistance from the NRCS to implement these on-farm conservation and efficiency projects through the EQIP program. The local NRCS has provided additional services within the EBID that includes inventory of irrigation structures, seepage analysis and mitigation, and other studies and conservation planning. Thus, Mr. Lewis and the local NRCS is familiar with the project and excited about the project because the project meets the local NRCS goals for water conservation. Reclamation can contact Mr. Lewis at sean.lewis@usda.gov or cell at 406.596.0050.

  - Applicants should provide letters of intent from farmers/ranchers in the affected project areas.

    None available at this time.

- Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.
  - Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installing a pressurized pipe through

WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation.

The proposed project will prevent water shortages by reducing water loss from excessive cautionary spills and eliminate canal seepage on the 600 ft long targeted reach. The EBID will be able to conserve approximately 7,497 acre-feet (2.44 billion gallons) resulting in 3.6 inches of additional water provided each year to 25,000 irrigated acres. A 3.6-inch increase represents a 4.41% increase in water provided to the entire system which is anticipated to correlate to a 4.41% increase in crop production for 25,000 acres. The proposed automation improvements to avoid excessive cautionary spills will provide the EBID water users with the precise amount of water that is necessary supporting efficient on-farm practices such as center pivot irrigation. Based on discussions with Mr. Shaw Lewis, NRCS District Conservationist in Dillon, the proposed improvements result in an optimal situation for farmers who want to put in efficient on-farm irrigation practices such as center pivots.

OR

- Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?

The proposed pump rehabilitation project will maximize efficiency in this area by providing mitigation to conserve 7,497 acre-feet per year, provide an increase to water delivery efficiency, and provide precise water delivery to facilitate on-farm efficiency.

- Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.
  - Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.

Based on information provided by the local NRCS, the proposed automation and canal lining improvements would provide more opportunities for landowners to incorporate on-farm water conservation and/or water use efficiency projects.

- Please provide a map of your water service area boundaries. If your project is selected for funding under this NOFO, this information will help NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance to complement funded WaterSMART projects.

A map depicting the EBID water service area boundaries is provided below.

Note: On-farm water conservation improvements that complement the water delivery improvement projects selected through this NOFO may be considered for NRCS funding and technical assistance to the extent that such assistance is available. For more information, including application deadlines and a description of available funding, please contact your local NRCS office. See the NRCS website for office *contact information, www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/states/.*

E.1.5. Evaluation Criterion E—Planning and Implementation (8 Points)

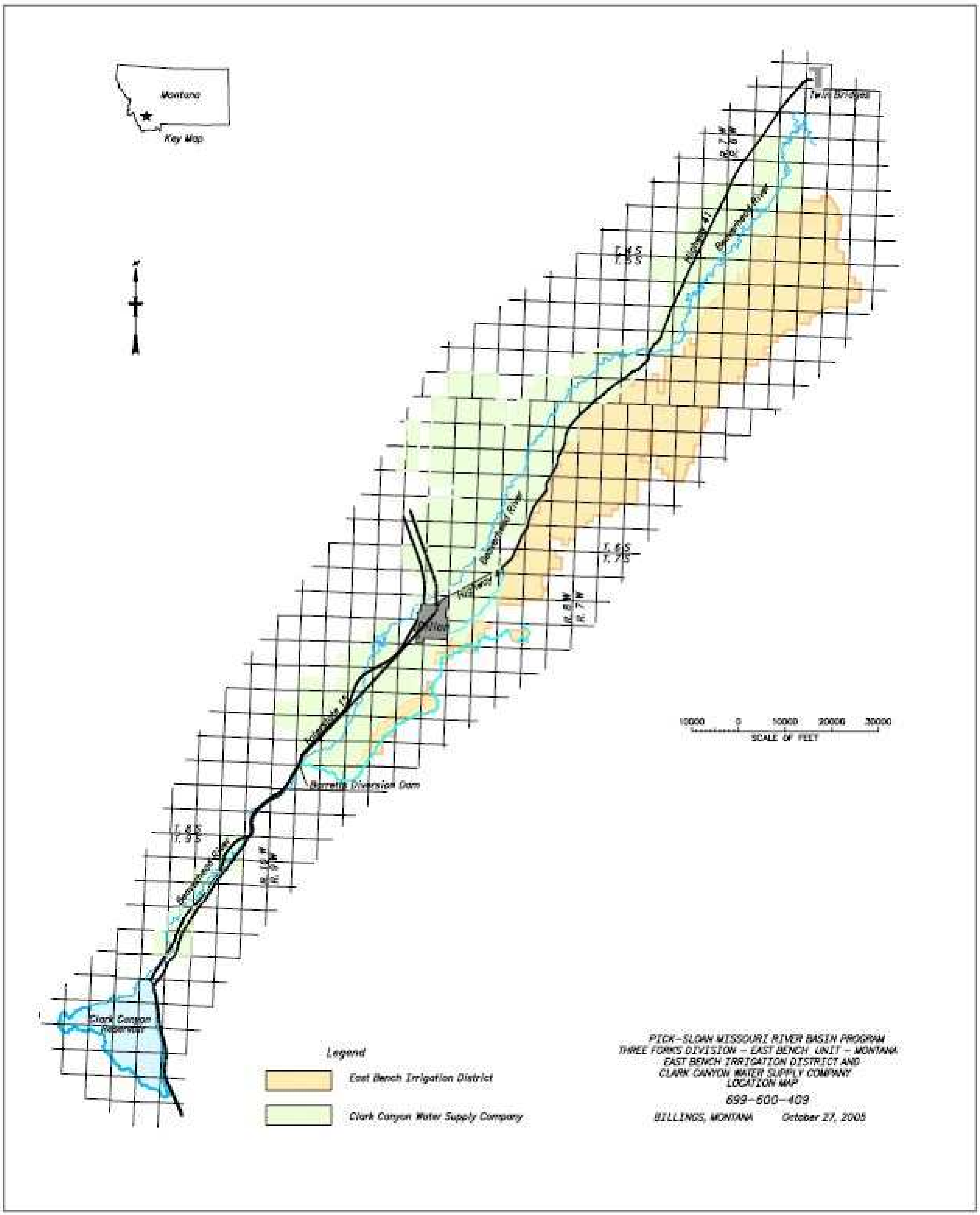
*Up to **8 points** may be awarded for these subcriteria.*

E.1.5.1. Subcriterion E.2 - Readiness to Proceed

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Does the project address an adaptation strategy identified in a completed WaterSMART Basin Study? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place. Including a specific excerpt or a link to the planning document may also be considered where appropriate.

Provide the following information regarding project planning:



(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.

The EBID follows the Montana State Water Plan and the Montana Drought Response Plan for overall water planning. The Montana Drought Response Plan (http://dnrc.mt.gov/divisions/water/drought-management) and the Montana

State Water Plan (http://dnrc.mt.gov/divisions/water/management/docs/state-water-plan/2015_mt_water_plan.pdf). In addition, the Missouri Headwaters Basin Study and Summary Report are used and provide guidance to the EBID for planning. The study can be found at https://www.usbr.gov/watersmart/bsp/docs/finalreport/Missouri/MissouriBasinStudyFinalReport.pdf.

and https://leg.mt.gov/content/Committees/Interim/2021-2022/Water-Policy/Oct2021/MissouriHeadwaters_BasinStudy_ExecutiveSummary.pdf

Based on the recommendation and objectives outlined in these plans, the EBID boards meets regularly to discuss projects that fit within the goals and objectives of all three plans.

Water conservation is high on this list as outlined on Page 67 of the Montana State Water Plan that identifies water use efficiency and water conservation as one of the primary goals and key recommendations to address water supply and demand in Montana. Page 24 of the Missouri Headwaters Basin Study recommends storing additional water in Clark Canyon Reservoir to decrease drawdown for flood storage and increase end of water year storage in dry years. They conclude there would be little impact on winter streamflow in the Beaverhead River downstream of Clark Canyon Reservoir, even in dry years. The EBID Board believes that the East Bench Irrigation District Carter Creek Lining & Headgate Automation Project is their highest priority in meeting these objectives.

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).

One of the Key Recommendations from the Montana State Water Plan developed to improve water supplies and meet demand is the implementation of water use efficiency and water conservation (Page 67 of the Montana State Water Plan). The plan also identifies other key recommendations to address water supply and demand that are relevant to this project including: improve and expand efforts to quantify surface water supplies and availability; increase flexibility to manage available water supplies through storage and rehabilitation of existing infrastructure; as well as support and expand existing drought preparedness and planning efforts.

(3) If applicable, provide a detailed description of how a project is addressing an adaptation strategy specifically identified in a completed WaterSMART Basin Study or Water Management Options Pilot (e.g., a strategy to mitigate the impacts of water shortages resulting from climate change, drought, increased demands, or other causes)

As discussed above, the Missouri Headwaters Basin Study and Summary Report outlines increasing water storage in Clark Canyon Reservoir. The full report also recommends increasing canal and on-farm irrigation efficiencies as a system-wide water management strategy. The study also references conserving water as a mitigation and response action for increased drought resilience (page 122). As previously described, the proposed rehabilitation project will provide precise control over the amount water flowing through the Wilson Creek and Carter Creek check structures. The automation will reduce cautionary spills and wasted water. Also, lining of the canal increases canal efficiency. The proposed improvements conserve water and deliver the precise amount of water that is needed to maximize the irrigation system, thereby conserving 7,497 acre-feet (2.44 billion gallons) per year. The water saved can be used to address water shortages in other parts of the system and Beaverhead River. The proposed project clearly helps meet the canal efficiency goal outlined in the Missouri Headwaters Basin Summary Report study.

For more information on Basin Studies, including a list of completed basin studies and reports, please visit: www.usbr.gov/WaterSMART/bsp.

E.1.5.2. Subcriterion E.2 – Readiness to Proceed

Points may be awarded based upon the extent to which the proposed project is capable of proceeding upon entering into a financial assistance agreement. Please note, if your project is selected, responses provided in this section will be used to develop the scope of work that will be included in the financial assistance agreement.

Applications that include a detailed project implementation plan (e.g., estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates) will receive the most points under this criterion.

- Identify and provide a summary description of the major tasks necessary to complete the project. Note: please do not repeat the more detailed technical project description provided in Section D.2.2.2. Application Content. This section should focus on a summary of the major tasks to be accomplished as part of the project.

  The proposed East Bench Irrigation District Carter Creek Lining & Headgate Automation Project will consist of the following tasks:

  - Planning – The project will require a planning level effort to coordinate activities for the project up-front following award and contracting with Reclamation.
  - Site Survey – The proposed pumping plant will need to be inspected and measurements taken to gather the baseline data required for design of the system controls and solar power array.
  - Design – The proposed automated controls, SCADA, telemetry system, and solar power array will need to be designed to meet the automation goals and objective. The canal lining will also need to be designed including alignment and grade, hydraulic profile, material specifications, and size requirements. A set of plans and specifications will be developed and submitted to EBID and Reclamation for approval.
  - Permitting – The necessary permits will need to be obtained to facilitate construction of the project. A copy of the permit documents will be

submitted to EBID and Reclamation. Permitting will include environmental and cultural resource compliance.
- Bid Documents – A bid package will be prepared for all construction, equipment, and installation services.
- Construction – A contractor(s) will be procured to provide installation of the new servo controls, remote monitoring and control components, automation monitoring components and appurtenant materials. Similarly, the contractor will complete the canal lining construction.
- Construction Administration – A Professional Engineer will be needed to provide construction administration, inspection of the work, and ensure compliance with the plans and specifications. Photos, submittal approvals, daily logs and other construction information will be saved and compiled throughout the project.
- As-Built Documentation – An Engineer will be needed to perform an as-built verification of the automation system and canal liner. A construction completion report will be submitted to EBID and Reclamation.
- Construction and Grant Close-Out – The EBID or consultant will be required to ensure that all the requirements of the construction and WaterSmart grant have been completed and submitted to Reclamation for approval.

- Describe any permits that will be required, along with the process for obtaining such permits.

For each of the permits listed below, the EBID will work with each permitting agency to determine whether a formal permit is needed for the construction of the proposed project. Although it is not anticipated that any permits will be needed, we have provided the following list of permits that the EBID will follow up on if the grant is awarded. If needed, the following permits may be obtained with assistance from the engineer during the design process:

SPA 124 Permit – The Montana Department of Fish, Wildlife & Parks requires a permit for any activity that physically alters or modifies the bed or banks of a perennially flowing stream for a legal public entity. Consultation will be performed, but the activities proposed herein are likely exempt from this rule. A Montana joint application form will need to be filled out and submitted to FWP for review.

404 Permit – The Army Corps of Engineers (USACE) requires a permit for any activity that will result in the discharge or placement of dredged or fill material into waters of the United States, including wetlands. Consultation will be performed, but the activities proposed herein are likely exempt as stated in CRF 323.4(a)3. A Montana joint application form will need to be filled out and submitted to the USACE for a determination.

318 Authorization – The Short-Term Water Quality Standard for Turbidity requires a permit for any construction activities that will cause temporary violations of state surface water quality standards for turbidity. Since no water will be in the lateral at the time of construction, no turbidity permit will be required.

Storm Water Discharge General Permit – State Storm Water Rules require a storm water discharge permit under the requirements of the 2018 General Permit for any construction project over one acre in total disturbance that discharges into State waters. A Notice of Intent form and Stormwater Pollution Prevention Plan Form along with all attachments and supplements will need to be submitted to the Montana Department of Environmental Quality.

Montana Sage Grouse Habitat Conservation Program - The program's role is to implement Montana's Sage Grouse Conservation Strategy including the conservation, restoration, and mitigation of changes to sage grouse habitat because of development. Montana has a website https://sagegrouse.mt.gov/ProgramMap that will need to be consulted prior to construction activities. The current map shows that there are no Sage Grouse Habitat within the construction area.

- Identify and describe any engineering or design work performed specifically in support of the proposed project.

The proposed project will require the assistance of an engineer for the design of the automation controls system, gate servos/motors, telemetry system, and solar array and battery backup systems. In addition, the assistance of an engineer is needed for the design of the canal liner. A site visit to inspect and take measurements of the check structures and canal will need to be completed, followed by the design of the proposed new pump system (including hydraulics, automation and control details, servo motors, and remote monitoring), followed by the development of plans and specifications for the proposed liner installation project (alignment/grade, details, etc.).

- Describe any new policies or administrative actions required to implement the project. N/A

- Please also include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: complete environmental and cultural compliance; mobilization; begin construction/installation; construction/installation (50% complete); and construction/installation (100% complete). Was the expected timeline for environmental and cultural compliance discussed with the local Reclamation Regional or Area Office?

Activity	Date(s)
WaterSmart Grant Due Date	July 28, 2022
Evaluate Grant Applications -- BOR	Jul 28, 2022 – Jan 2023
Grant Award	February 2023
Contract Execution	March 2023 – June 2023
Project Initiation	June 2023

Activity	Date(s)
Project Kickoff Meeting	July 2023
Project Site Survey	August 2023
Project Design	Sept 2023 – March 2024
Environmental/Cultural Resource Compliance	Nov 2023 – May 2024
LYID#1 and Reclamation Plans Review	April 2024 – June 2024
Final Plans & Specifications	July 2024
Order Materials*	July 2024
Begin Construction	Nov 2024
Mid-Point Construction (50%)	June 2025
End Construction (100%)	Oct 2025
Construction Administration	Oct 2024 – Dec 2025
Construction Closeout	Oct 2025
As-Built Verification	Nov 2025
Construction Completion Report	Dec 2025
Grant Closeout	Dec 2025
Project Completion	Dec 2025

*Based on current materials availability. This may need to be changed pending future supply/demand.

E.1.6. Evaluation Criterion F—Collaboration (6 points)

Up to 6 points may be awarded for projects that promote and encourage collaboration among parties in a way that helps increase the sustainability of the water supply.

- Please describe how the project promotes and encourages collaboration. Consider the following:

  The EBID manager attends and actively participates in training seminars, courses, and conferences such as Montana Water Resources Association (MWRA), Montana Association of Dams and Canal Systems (MADCS), Upper Missouri Water Association (UMWA), the US BOR Montana Area Office's Dam Operator Trainings, and watershed symposiums throughout Montana where they collaborate and share information. One of the primary topics as of late is the implementation of remote monitoring and control systems to improve irrigation efficiency. The EBID is committed to sharing the success and implementation of this project with other districts and water user associations throughout the region to assist them in their planning and water delivery efforts.

- Is there widespread support for the project? Please provide specific details regarding any support and/or partners involved in the project. What is the extent of their involvement in the process?

  The EBID Board, Beaverhead County Conservation District and the NRCS have all shown support for this project. The EBID Board will make financial, labor, equipment and contracting/material purchasing decisions as well as provide overall management of the project. The Beaverhead County Conservation

District, NRCS, and local water users were consulted on the project and will continue to be consulted throughout the project.

- What is the significance of the collaboration/support?

  The Beaverhead County Conservation District works with not only other water users in the area but also shares their success stories with the other conservation districts throughout the State through the Montana Association of Conservation Districts. This project and information will be shared with the other conservation districts who in turn share the information with nearly all the remaining irrigation districts and water user associations throughout the State of Montana.

  The NRCS was consulted about this project and the agency is monitoring this project closely to determine the actual benefits of the proposed improvements. The NRCS is a national organization that provides training, technical support, and knowledge sharing throughout the US, and this information would be shared with the national program and neighboring states that could benefit a broad audience of water users.

- Will this project increase the possibility/likelihood of future water conservation improvements by other water users?

  The implementation of this project and the sharing of its benefits through the Montana Association of Dams and Canal Systems (MADCS), Montana Water Resources Association, the Montana Association of Conservation Districts, Upper Missouri Water Association, and the NRCS provides a large audience to promote and share this project, learn from the project, and evaluate the benefits of check structure automation that reduce cautionary spills, solar power, and remote monitoring for irrigation districts and water users associations throughout the western US.

- Please attach any relevant supporting documents (e.g., letters of support or memorandum of understanding).

  Letters of support are attached as Appendix B.

E.1.7. Evaluation Criterion G—Additional Non-Federal Funding (4 points)

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided using the following calculation:

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}}$$

The EBID is proposing to contribute $125,000 in grant funds from the Montana DNRC Renewable Resource Grant and $63,296.27 from cash reserves for a total project cost of $376,592.54. This equates to the EBID contributing 50% of the total project budget with grant funding and cash support.

E.1.8. Evaluation Criterion H—Nexus to Reclamation (4 points)

Up to 4 points may be awarded if the proposed project is connected to a Reclamation project or Reclamation activity. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

- Describe the nexus between the proposed project and a Reclamation project or Reclamation activity. Please consider:

The EBID is a Reclamation project and increasing water use efficiency is a benefit to water users by automating check structures and canal lining. Historically, the first water resources inventory relating to the EBID unit was made by the War Department during 1928-33. In the fall of 1938, the Bureau of Reclamation began investigations that ultimately led to a reconnaissance report for the Missouri River and its tributaries. Field work was started in May 1940, and a draft of the report was completed in May 1943. The final report was published in Senate Document 191 (78th Congress, 2d session).

The East Bench Unit was included in the plan for the Pick-Sloan Missouri Basin Program (formerly Missouri River Basin Project). Following authorization of the Pick-Sloan Missouri River Basin Program, investigations were completed throughout the basin. Investigations for the East Bench Unit were conducted in 1956. The Reclamation let a contract for the construction of Clark Canyon Dam in September 1961, and the structure was completed in 1964. Other project features were begun in 1961 and completed in 1963.

The unit provides full irrigation service to 21,800 acres and supplemental irrigation service to 28,000 acres. Currently, 25,000 acres are irrigated. Principal features include Clark Canyon Dam and Reservoir, Barretts Diversion Dam, East Bench Canal, and a system of laterals and drains. Clark Canyon Dam was constructed at the head of the Beaverhead River to impound surplus flows of Horse Prairie Creek and Red Rock River, which join to form the Beaverhead River. Water stored at Clark Canyon Reservoir is released into the Beaverhead River for downstream irrigation.

Barretts Diversion Dam, 11 miles below Clark Canyon Dam, diverts water from Beaverhead River to the East Bench Canal. About 25,000 acres of irrigable land on East Bench are served through a system of laterals. The East Bench Canal begins at the Barretts Diversion Dam and runs in a northeasterly direction for 44.2 miles. Initial capacity of the canal was 440 cubic feet per second. The lateral system has a total length of 61.1 miles. The drainage system has a total length of 16.7 miles.

- Does the applicant have a water service, repayment, or operations and maintenance (O&M) contract with Reclamation?

  Yes, the applicant is the EBID and receives Reclamation project water through a Reclamation Water Service Contract last renegotiated in 2006.

- If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?

  N/A

- Will the proposed work benefit a Reclamation project area or activity?

  Yes, the proposed project will benefit the EBID water users.

- Is the applicant a Tribe?

  No

Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved or better managed, energy generated or saved). For more information calculating performance measure, see Appendix A: Benefit Quantification and Performance Measure Guidance.

The EBID maintains flow records for the canal system and check structures useful to monitor and compare historic flows and future inputs into system. The water savings will be verified by the measurements taken at the two check structures and subtracting out the daily flows taken at each turnout. Once the project is completed, these records will be maintained in the future to validate the proposed water conservation savings.

The proposed improvements will provide the EBID the ability to measure diverted flows in real-time. The check structures will be controlled and monitored through remote monitoring and control components that will tie into the updated EBID monitoring system. The remote monitoring system will log the flow data in EBID computer system that can be compared to diversion data to quantify the water conservation savings.

The proposed improvements will allow the EBID to control and monitor flows very precisely. The EBID also closely monitors snowpack, reservoir levels, river flow flows, and flows into their diversion system. These tools allow the EBID to predict the amount of water that will be available on short notice and provide drought management tools to better allocate water during droughts. The change will result in more water for downstream users when water rationing is required.