WaterSMART Grant

Water and Energy Efficiency Grant for Fiscal Year 2023

Funding Opportunity Announcement No. R23AS00008

C-Canal Headworks Automation Project

WWC ENGINEERING

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APPENDICES

D.2.2.2 TECHNICAL PROPOSAL CONTENT

EXECUTIVE SUMMARY

The executive summary should include:

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

  Date: July 12, 2022
  Applicant Name: Pondera County Canal and Reservoir Company (PCCRC)
  Address: PO Box 245, 501 Pondera Avenue, Valier, MT 59486 (Pondera 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 PCCRC is a Category A applicant, designed as other organizations with water or power delivery authority.

- 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 Pondera County Canal and Reservoir Company (PCCRC) is proposing the installation of remote monitoring capabilities at the two C-Canal Headworks locations at Kunkle Drop and the North Dike of Lake Frances. In addition, the project will include remote gate automation at the North Dike of Lake Frances location which will allow for full automation of C-Canal flows. The North Dike and Kunkle Drop sites are located approximately 1.5 mile and 5 miles southwest of Valier, MT, respectively. The C-Canal Headworks Automation Project will address the extremely difficult and time-intensive demands required to operate the C-Canal inputs effectively. The Direct Flow Headworks at Kunkle Drop and Storage Headworks at the North Dike of Lake Frances require staff to be on-site multiple times each day, particularly during peak irrigation season, to monitor water levels and coordinate gate positions to match inflows and headwater elevations at each location to downstream demands. The proposed improvements will conserve an estimated 4,462 acre-feet of water within the Birch Creek Reservoir and 1,680 acre-feet of water each year within Lake Frances each year. The improvements in late season storage will significantly improve the PCCRC system's drought resiliency. The 2021 drought conditions within the large majority of Pondera County are considered Exceptional Drought

by the U.S. Drought Monitor. Project partners include the Pondera County Conservation District and the local water users.

- 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: 3/2024
  Proposed Construction End Date: 4/2025
  Project Duration: 24 Months

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

  No.

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 C-Canal headworks locations consist of the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at North Dike. Both C-Canal Headworks structures are located in Pondera County, Montana. The Direct Flow Headworks at Kunkle Drop is located 5.0 miles southwest of Valier, MT at 48.272621°N, 112.345723°W in Section 14, Township 29 North, Range 6 West. The Storage Headworks at the North Dike on Lake Frances is located 1.3 mile southwest of Valier, MT at 48.307888°N, 112.290469°W in Section 5, Township 29 North, Range 5 West. A map is provided as Exhibit 1. Exhibit 2 provides a vicinity map showing each location in relation to the larger PCCRC system. Exhibit 3 provides an enlarged view of the Direct Flow Headworks at Kunkle Drop and Exhibit 4 provides an enlarged view of the Storage Headworks at the North Dike of Lake Frances.

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.

The PCCRC's irrigation system is divided into five (5) main irrigation districts, with District 1 and portions of District 2 being located between Swift Dam and Lake Frances. The larger portion of District 2 as well as the entirety of Districts 3, 4, and 5 are located downstream of Lake Frances. The PCCRC irrigation system begins at Swift Dam on the Birch Creek Reservoir located roughly 40 miles southwest of Valier, MT. Swift

Dam outflows are released into Birch Creek where they travel approximately 12.5 miles until they reach the Birch Creek Diversion. Upon arrival at the Birch Creek Diversion, flows are diverted down the PCCRC's B-Canal for approximately 14.3 canal miles before converging with flows from Dupuyer Creek. Following an approximate 0.5-mile length of Dupuyer Creek in which B-Canal and Dupuyer Creek flows unite, the combined flows arrive at the Dupuyer Creek Diversion and are diverted down the PCCRC's D-Canal. Flows continue down the D-Canal for approximately 3.2 miles where they arrive at the C-Canal's Direct Flow Headworks at Kunkle Drop. Flows at the C-Canal Direct Flow Headworks are split between the C-Canal and the C-3 Canal as follows:

- C-3 Canal flows are directed to Lake Frances for reservoir storage where the C-3 canal ends; and
- C-Canal flows downstream of the Direct Flow Headworks provide irrigation to approximately 600 acres of the PCCRC's District 2 that are only supplied via the Direct Flow, Kunkle Drop Headworks. Past this portion, the C-Canal services approximately 22,300 acres within the PCCRC's District 2. These areas can either be serviced via Kunkle Drop, or if the elevation of Lake Frances is high enough, the North Dike Headworks.

The C-Canal is unique in that it is supplied by a system of dual headworks, both of which are operated manually. The two C-Canal Headworks locations include the Direct Flow Headworks at Kunkle Drop as well as the Storage Headworks at the North Dike on Lake Frances.

The Direct Flow Headworks at Kunkle Drop is located 3 miles downstream of the Dupuyer Creek Diversion. The Headworks at Kunkle Drop marks the end of the D-Canal and the start of the C-Canal. The drop consists of a concrete splitter structure that is located roughly 65 feet above the maximum storage elevation of Lake Frances. Here water is either turned out of four (4) four-foot wide, wheeled slide gates into the C-Canal, or passively bypassed in the C-3 Canal, which flows directly into Lake Frances. A sharp-crested rectangular weir is located several hundred feet downstream of the Kunkle Drop gates. The Kunkle weir is manually measured using a staff gage that correlates to empirically derived outflow charts, which are calibrated periodically via PCCRC staff utilizing digital, sonar FlowTracker equipment. The district 2E ditch rider, responsible for C-Canal Headworks operations, currently adjusts the Kunkle Drop gates approximately twice daily.

The Storage Headworks at the North Dike of Lake Frances is located three miles downstream of the Kunkle Drop. The North Dike Headworks consists of a concrete structure in-line with the northern reservoir embankment of Lake Frances. The structure discharges flow through three (3) submerged cast-in-place concrete pipes. Two (2) five-foot wide by four-foot-tall rectangular outlets are positioned on either side of a larger six-foot diameter circular outlet. One or two of the rectangular outlets are used with the central pipe only being mobilized in extreme circumstances such as emergency flood relief. The inverts of the three outlet pipes at the North Dike are

roughly 75 feet lower in elevation than the structure at Kunkle Drop. The lake side of the structure was rehabilitated in 2008 with new concrete bulkheads and new cast iron slide gates. The concrete pipes and concrete energy dissipation hood are showing signs of cavitation damage and will require minor rehabilitation work that is not part of this planned project. A minor maintenance project to repair the cavitation is planned for the fall of 2022 (or spring of 2023).

Discharges from the North Dike combine in the C-Canal with flows contributed from Kunkle Drop, which is positioned roughly three canal miles upstream. The combined flows are measured utilizing two existing digital sonar flowmeters, which were installed in 2014 in the inverts of two existing concrete box culvert crossings under Highway 44. These flowmeters are located roughly 200 yards downstream of the North Dike Headworks. The lack of a flow measurement weir in the vicinity of the North Dike Headworks created the need to use flowmeters within the box culverts. However, the flow through these culverts is not always laminar. In order to provide a validation on the digital sonar meters, the PCCRC desires to include the construction of a flow measurement weir downstream of the box culverts as part of this project. This weir will provide a more accurate method for flow measurement of combined flows downstream of the North Dike. Figure 1 provides a flow diagram showing the complex nature of the irrigation system as well as the C-Canal Headworks locations in relation to the system.

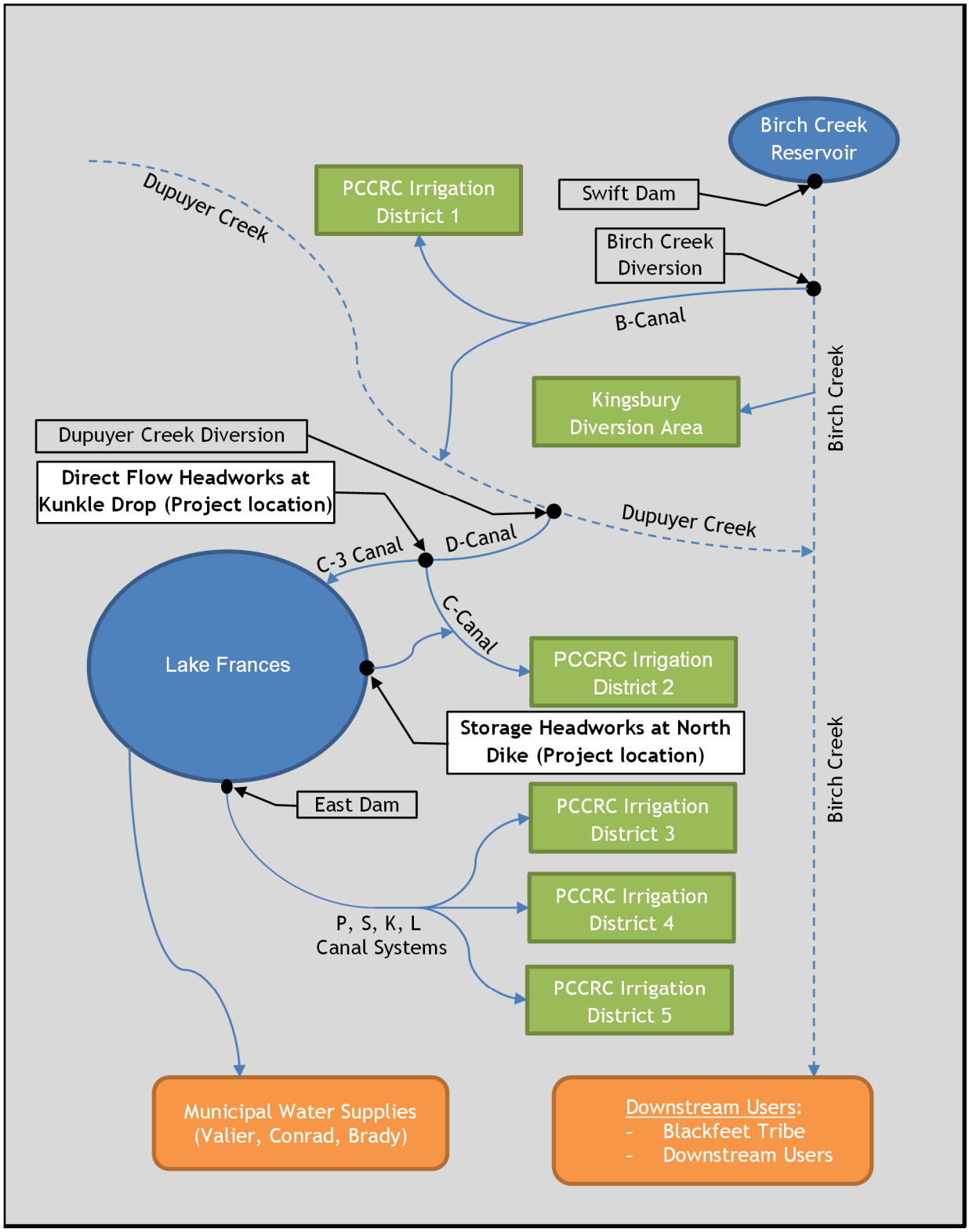

Figure 1. Irrigation System Schematic

Irrigation System Operations

A description of the PCCRC's annual water cycle is critical to understanding the significance of the C-Canal Headworks Automation Project to the function of the water system. For reference, the PCCRC's typical water cycle is described below.

- October 1 – November 1 (early off-season): Immediately following the irrigation season, the PCCRC staff drains the Birch Creek Reservoir of some of the remaining storage water. The PCCRC staff directs these releases toward Lake Frances and then closes the outlet gates at Swift Dam along with the PCCRC's canal system.
- November 1 – March 1 (Off-Season): Swift Dam begins impounding water within the Birch Creek Reservoir for use during the upcoming winter and spring. The PCCRC maintains an approximate 10 cubic feet per second (cfs) release from Swift Dam's single jet valve to maintain in-stream baseflows for the fish populations and for stream health within Birch Creek immediately downstream of the dam.
- March 1 – May 1 (late Off-Season): The PCCRC either partially or fully opens the main outlet gates at Swift Dam to ensure adequate storage capacity within Birch Creek Reservoir is available for the coming snowmelt and spring rains. Most flows released during this early season release are diverted into Lake Frances to increase the storage pool in that location. The flow path for this diversion occurs via the Birch Creek, B-Canal, Dupuyer Creek, and D-Canal flow path.
- May 1 – October 1 (Irrigation Season): The PCCRC delivers water to water users throughout the system. During the earlier portions of the irrigation season, Swift Dam is utilized to collect spring and summer runoff for the purpose of metered release during the later irrigation season.
- October 1 (end of water year): Following the subsequent water shutoff after the irrigation season, the new water year begins, and the annual cycle repeats.

Problems and Needs

The C-Canal Headworks locations were constructed at the inception of the PCCRC irrigation system creation in the early 1900s. Both the Direct Flow Headworks at Kunkle Drop and Storage Headworks at the North Dike of Lake Frances require staff to be on-site multiple times each day, particularly during peak irrigation season, to monitor water levels and coordinate gate positions to match inflows and headwater elevations at each location to downstream demands. During peak irrigation season, three or more daily visits to each location are often required. The time-intensive nature of the C-Canal's operations puts a significant demand on the PCCRC's staff. Further, the delicate requirements of the C-Canal's operations require experienced ditch riders

that are intimately familiar with the operational requirements at the C-Canal headworks locations.

The PCCRC has always endeavored to operate their irrigation system in the most efficient manner possible. However, the PCCRC is often limited in the number of staff-hours available to operate the C-Canal Headworks locations, particularly with each location being three miles apart and requiring return trips to coordinate gate positions at each location. An added challenge in operating the C-Canal Headworks is that flows diverted toward the Direct Flow Headworks at Kunkle Drop can vary significantly throughout each day due to natural flow inputs from Dupuyer Creek itself. Changes in Dupuyer Creek affect flows turned into the C-Canal at Kunkle Drop.

Outflows at the North Dike gates at Lake Frances are similarly impacted by reductions in the pool elevation of Lake Frances, particularly during heavy withdrawal periods. The Storage Headworks is a low-head outlet; at maximum pool, the water surface is only 12 feet above the inverts of the outlet pipes. During peak irrigation use, Lake Frances can drop twelve (12) inches in elevation each day. When discharging hundreds of cubic feet per second from the North Dike into the C-Canal, large reductions in flow into the C-Canal can occur with a minor reduction in lake levels. Flows out of the Storage Headworks may reduce as much as 25 cfs over the course of a 24-hour period due to lowering reservoir levels, and 10 to 15 cfs reductions in flows to the C-Canal from the Storage Headworks are common during overnight periods. Mistimed or miscalculated adjustments at the North Dike can result in drastic water shortages at the end of the 28-mile-long C-Canal system.

With the advent of accurate and reliable automation technology, significant operational efficiencies are available to irrigation system operators which would eliminate the majority of the staff-hours required to operate the C-Canal Headworks. As evidenced with prior automation projects implemented throughout their irrigation system, the PCCRC has aggressively pursued projects that promote both water savings and operational efficiency. With the large and complex nature of the PCCRC's water system, automation projects on strategic infrastructure locations are critical to ensuring the sustainable operations of the system.

Specific Activities that will be Accomplished

Design/Permitting/Construction Oversight: The PCCRC will contract with a licensed Professional Engineer to complete the design of the C Canal Headworks Automation Project. The Engineer will be responsible for the design of the proposed project, which will include, but is not limited to hydraulics, geotechnical analysis, structural analysis, gate and structure automation details, remote monitoring and control system components, automation and controls, alignment/grade, details, etc. The Engineer will work with regulatory agencies to complete environmental compliance activities (as necessary). 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.

The proposed project will involve the installation of a SCADA system and flow measurement weirs for remote flow monitoring at both the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at the North Dike of Lake Frances. The proposed project would further include the automation of gate operations at the Storage Headworks at the North Dike of Lake Frances. The Storage Headworks at the North Dike include a total of three slide gates with the center gate consisting of a six-foot-wide center slide gate and two (2) five-foot-wide slide gates on each side of the center gate. All three gates at this location are in relatively good condition and would not need replacement. Remote gate control would be achieved via automation of the installation of remote gate actuators on the two (2) five-foot-wide gates only, as the larger central gate is primarily used for emergency releases and would not require automation.

The proposed project would allow the PCCRC to remotely monitor flows into and out of each C-Canal Headworks structure as well as remotely control flow diversions at the North Dike location into the C-Canal. The system would provide flow readings, data logging, and a continuously updated record of flows at both headworks locations. With the addition of remote gate control at North Dike, the project would significantly improve operational efficiencies for the C-Canal's operations. For flow adjustments to downstream C-Canal water users, PCCRC staff would be able to maintain constant gate positions at the Kunkle Drop location while remotely adjusting gate positions at the North Dike. As upstream pressure head variations at the North Dike are much more variable, providing remote automation of the Storage Headworks would maximize management of the system and minimize carriage waters and waste.

Construction: The proposed project will be completed using PCCRC personnel and equipment as well as assistance from an electrician and remote monitoring and control installer. The PCCRC owns construction equipment and has the resources, knowledge, and experience necessary to install flow monitoring weirs. The PCCRC has their own construction crew to be able to maintain existing PCCRC infrastructure and keep costs low, providing a benefit to their users. The PCCRC has an experienced earthwork and concrete construction crew that will perform any civil and structural field work. The main component of the project will be the installation of a supervisory control and data acquisition (SCADA) system at the C Canal Headworks locations. A SCADA system is a software and hardware package that allows for the remote monitoring, gathering, and processing of data and/or to control processes such as gate operations remotely. In general, a SCADA system is comprised of a programmable logic controller (PLC) or remote terminal unit (RTU), a telemetry system, and a software package. The installation of the SCADA system for remote monitoring and control of irrigation flows at the C Canal Headworks locations will be performed via a licensed automation contractor/installer. This contractor/installer will be selected via public bid. The PCCRC has recent experience with projects of this nature where civil and structural work are performed by PCCRC crews and the automation system procurement and installation is performed by a licensed contractor specializing in automation and control work. Recent PCCRC projects of this nature include the recent Swift Dam

Automation Project, Kingsbury Turnout Automation Project, and Dupuyer Creek Diversion Automation Project (currently underway).

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 conservation, drought resiliency, and support the goals of E.O. 14008. The proposed C-Canal Headworks project will allow the PCCRC to conserve water within the Birch Creek Reservoir by reducing the amount of buffer flow released at Swift Dam throughout each irrigation season. The PCCRC's system, particularly between Birch Creek Reservoir and Lake Frances consists of a complex series of natural creeks, canals, and diversion structures along with intermittent on-farm water users. Water released from Birch Creek Reservoir at Swift Dam takes a long time to reach the C-Canal's Kunkle Drop where it is split with a portion continuing down the main C-Canal and a portion diverted into Lake Frances via the C-3 Canal. The complicated nature of flow operations, long duration between Birch Creek Reservoir (Swift Dam) releases and arrival at the C-Canal require excess flows be released from Swift Dam continuously throughout the irrigation season. These excess flows are released to make up for uncertainties in flow arrivals at the C-Canal Headworks while ensuring adequate water deliveries to downstream water users. The PCCRC does make deliveries along the C-3 Canal downstream of Kunkle Drop and upstream of Lake Frances. The proposed automation of the C-Canal Headworks locations will allow the PCCRC to have real-time flow measurement and control capabilities within the C-Canal. As a result of the proposed project, in conjunction with the ongoing automation of the Dupuyer Creek Headworks, the magnitude of excess water released from Birch Creek Reservoir (Swift Dam) will be reduced by an estimated 4,462 acre-feet per year. The anticipated increase in late season storage of 4,462 acre-feet of water within Birch Creek Reservoir would allow the PCCRC to provide an additional 0.74 inch of irrigation water throughout the entire PCCRC system. An increase of 0.74 inch represents an approximate 7% increase in allotment when compared to the 10-inch average over the past three seasons. With a 7% increase in water allotment, an equivalent increase in crop production throughout the entire 72,000 irrigated acres within the PCCRC system can be assumed. If realized, the projected yield improvements could produce a regional agricultural revenue increase of $2,904,940 per year.

The Storage Headworks at the North Dike of Lake Frances consists of a low-head outlet with a maximum pool elevation within Lake Frances only 12 feet above the invert elevation of the outlet pipes. At peak irrigation use, Lake Frances can drop 12 inches over the course of a 24-hour period. As water levels within Lake Frances drop, the corresponding outflow from the North Dike Headworks reduces due to the decreasing

head above the outlet pipes. PCCRC staff must sleep and have additional work demands outside of the North Dike structure. They cannot be on-site at the Storage Headworks on a full-time basis. With the outflows at the Storage Headworks so dependent on head above the outlet pipes and the impossibility of around-the-clock monitoring at the site, the PCCRC is required to release excess flows at this location to ensure adequate flows are available downstream on the C-Canal which is of additional importance for users at the furthest end of the canal. Through the implementation of the C-Canal Headworks Automation Project, flows out of the Storage Headworks at the North Dike would be automated, and gate positions would automatically adjust to Lake Frances water elevations to ensure a consistent flow downstream in the C-Canal. The automation of the storage headworks would allow the PCCRC to conserve an estimated 1,680 acre-feet of water each year within Lake Frances as a result of the proposed project.

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.

The excess water currently released from Birch Creek Reservoir (Swift Dam) is estimated at 30 cfs throughout the entire 150-day irrigation season. Through automating the C-Canal Headworks (in conjunction with the Dupuyer Diversion Automation), the 30 cfs in excess releases would be reduced by 50%. A 15 cfs reduction in excess flows from Birch Creek Reservoir over the 150-day irrigation season amounts to a water savings of 4,462 acre-feet of water remaining in Birch Creek Reservoir as storage later in the irrigation season. The improvement in late season storage at Birch Creek Reservoir will significantly improve the PCCRC system's drought resiliency. The PCCRC maintains detailed water records, and the water savings that result from the proposed project will be quantified and recorded. The PCCRC has begun implementing remote automation projects on critical pieces of infrastructure throughout their water delivery system and have a proven track record in achieving water conservation benefits via the implementation of these automation projects.

In addition to the 4,462 acre-feet of water savings in Birch Creek Reservoir, additional water savings within Lake Frances will result from the proposed project. The PCCRC estimates that approximately 10% of flows released into the C-Canal during peak flows at the Storage Headworks (North Dike) site is excess flow that is required to buffer against Lake Frances water level drawdown. With the automation of the Storage Headworks, flow measurements and controls would be able to be made remotely and automatically. As a result, this 10% excess flow would be able to be minimized, thus conserving an estimated 1,680 acre-feet of water each year within Lake Frances.

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)?

Currently, excess releases from Birch Creek Reservoir are direct to Lake Frances. From Lake Frances, excess releases at the Storage Headworks at the North Dike are released into the C-Canal system. From the C-Canal system, the PCCRC estimates that of the vast majority of the excess releases are lost due to spillage at the end of the C-Canal into a tributary to the Marias River approximately 2 miles upstream of the river. Any returned water to the Marias River has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients within the river.

The PCCRC's current standard operating requirements dictate that a buffer flow of 30 cubic feet per second (cfs) of water above anticipated demands be continuously released from Birch Creek Reservoir via the Swift Dam outlet structure throughout the 150-day irrigation season. The purpose of this buffer is to allow for uncertainties in irrigation demands within the C-Canal as well as to accommodate direct flow variations from Dupuyer Creek. This buffer water empties into the PCCRC's larger storage reservoir, Lake Frances, and is unable to be used in the upper portions of the PCCRC irrigation system. At Lake Frances, the lower portion of the C-Canal is fed via the Storage Headworks at the North Dike of Lake Frances. The Storage Headworks consists of a low-head outlet with a maximum pool elevation within Lake Frances only 12 feet above the invert elevation of the outlet pipes. At peak irrigation use, Lake Frances can drop 12 inches over the course of a 24-hour period. As water levels within Lake Frances drop, the corresponding outflow from the North Dike Headworks reduces due to the decreasing head above the outlet pipes. It is impractical for PCCRC staff to be on site monitoring the Storage Headworks around the clock and still perform the balance of their vital duties. With the outflows at the Storage Headworks so dependent on head pressure above the outlet pipes and due to the impossibility of around the clock monitoring, the PCCRC is required to release excess flows at this location to ensure adequate flows are available downstream on the C-Canal which is of additional importance for users at the furthest end of the canal.

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?

The PCCRC estimates that the vast majority of excess water released into C-Canal via the Storage Headworks at the North Dike of Lake Frances is lost to end spillage. This higher-temperature spill water is loaded with sediment and nutrients that is ultimately returned to the Marias River.

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?

There are no benefits associated with where the current water losses are going. Spillage discharge channels are steep and are not known to support fish or aquatic species. The excess releases are prematurely lowering water levels within Birch Creek Reservoir, Birch Creek, and Lake Frances which each provide important habitat for fish and animal species. The returned water to the Marias River that results from excess releases has a higher temperature and increased sediment and nutrient load than the Marias River's base flows, having an adverse effect on Marias River water quality.

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.

The proposed project will provide up to a total of 6,142 acre-feet of water conservation benefit annually over the next 20 years. These water losses are current, ongoing losses in the form of excess buffer flows diverted at the C-Canal Headworks locations to account for irrigation system inefficiencies. This water savings will occur via the installation of remote monitoring and control of diverted flows at the C-Canal Headworks locations: the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at the North Dike of Lake Frances. The quantity of water savings includes the 4,462 acre-feet of annual water savings within Birch Creek Reservoir and 1,680 acre-feet of annual water savings within Lake Frances. Supporting details and calculations are provided in subsequent sections of this grant application. The PCCRC maintains meticulous flow records, and the applicable records are provided in Appendix A of this application for reference.

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. N/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. N/A

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)? N/A

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? N/A

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

f. Include a detailed description of the materials being used. N/A

(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.

The proposed project will provide an estimated total of 6,142 acre-feet of water conservation benefit annually over the next 20 years. These water losses are current, ongoing losses in the form of excess buffer flows diverted at the C-Canal Headworks locations to account for irrigation system inefficiencies. This water savings will occur via the installation of remote monitoring and control of diverted flows at the C-Canal Headworks locations: the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at the North Dike of Lake Frances.

Water Savings Estimate for Birch Creek Reservoir:

The PCCRC's current standard operating requirements dictate that a buffer flow of 30 cubic feet per second (cfs) of water above anticipated demands be continuously released from the Birch Creek Reservoir via the Swift Dam outlet structure throughout the 150-day irrigation season. This buffer can be shown through the water measurements and water deliveries documented by the PCCRC as shown in Appendix A. The purpose of this buffer is to allow for uncertainties in irrigation demands on the C-Canal as well as complexity of the water delivery system between Swift Dam and the C-Canal. With remote automation of the C-Canal Headworks, the PCCRC would be able to match Swift Dam releases to demands on the C-Canal, and the PCCRC would be able to reduce the buffer released from Swift Dam by approximately 50%. Over the course of the 150-day irrigation season, the water conservation potential calculation is as follows:

50% x (30 ft^3/second) x (86,400 seconds/1 day) x (1 ac-ft/43,560 ft^3) x (150 days) = 4,462 ac-ft.

As a result of the proposed project, a 15 cfs reduction in excess flows from Birch Creek Reservoir over the 150-day irrigation season amounts to a water savings of 4,462 acre-feet of water remaining in Birch Creek Reservoir as storage later in the irrigation season. The improvement in late season storage at Birch Creek Reservoir will significantly improve the PCCRC system's drought resiliency. The conservation benefits will continue throughout each year of the anticipated 30-year design life of the project, and the conservation savings will be measured, recorded, and summarized as water records by PCCRC staff annually.

Water Savings Estimate for Lake Frances:

An analysis of water records for the latest two water years, 2020 and 2021, shows that water diverted out of the Storage Headworks at the North Dike of Lake Frances is approximately 16,800 acre-feet per year total. The PCCRC estimates that 10% of the total release from the North Dike represents excess outflows which are necessary to ensure adequate head is over the outlet pipes to compensate for the variable water surface elevation in Lake Frances. The excess release amounts to an average of 1,680 acre-feet per year, most of which spills out of the end of the C-Canal and as District 2E waste discharge.

As can be seen in the Delivery Efficiency chart for the PCCRC's District 2 Ditch Riders (below Figure 2), District 2E has been operated at a typical efficiency of approximately 85 percent over the past 5 seasons.

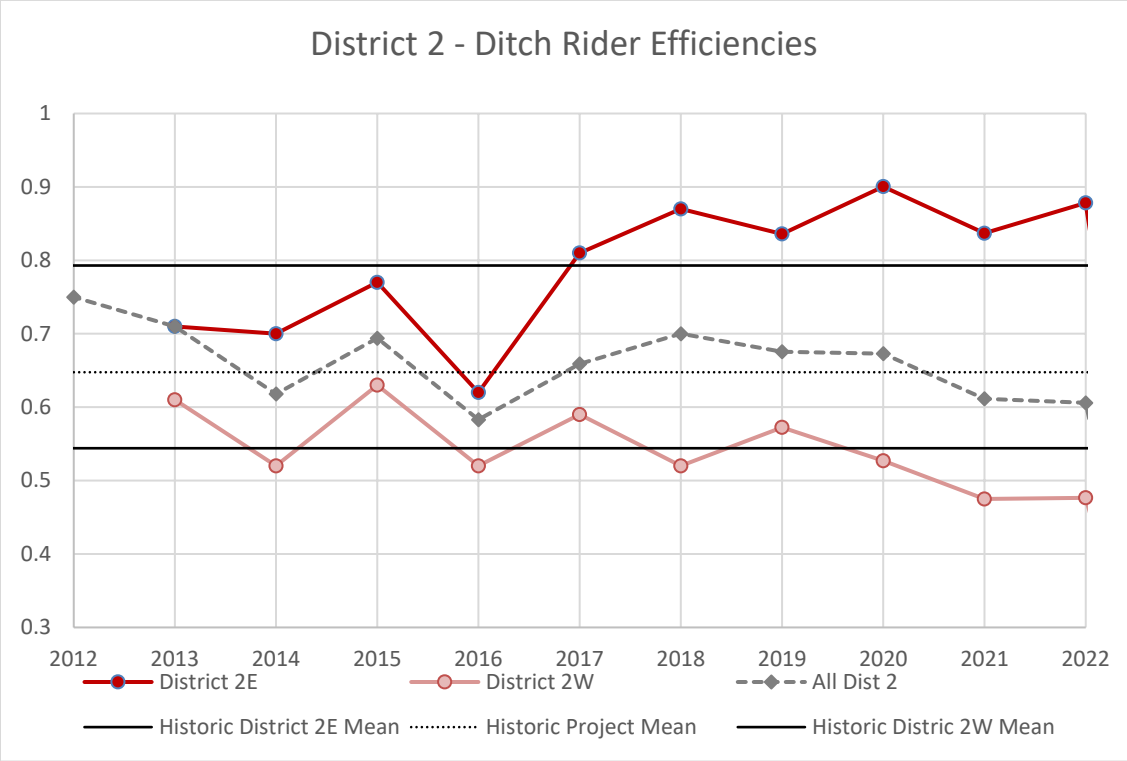

Figure 2. District 2 - Ditch Rider Efficiencies

Figure 2 compares the irrigation demand at the pump (or flood gate) with the amount of water that PCCRC's operators must turn in to the canal systems to reliably satisfy the requested demand.

There will always be some variability in efficiencies due the staff, producer cropping demands/types, and climatic variables. However, this project focuses on further improving the efficiency of District 2E deliveries. District 2E services District 2W. All flows from District 2W are released via minor diversion turnouts on the A and AN Canals. Adjustments to these laterals are made manually by the 2E Rider high up in the 2E System. District 2W has dozens of side-laterals,

ditches, and minor canals, each with its own carriage/waste discharges. As such, the burdened efficiency of District 2W will always be lower than that of District 2E.

District 2E is predominantly a direct delivery system with one main trunk (the C-Canal). Because District 2W flows are held relatively constant, virtually all of the carriage/waste water required from the North Dike Storage Headworks spills out as waste at the end of the long C-Canal. Thus, this project endeavors to reduce the amount of excess release water through automation. The PCCRC estimates that the burdened delivery efficiency of District 2E can be increased by as much as 10 percent through the automation of the C-Canal Headworks. Table 1 presents a summary of the PCCRC's North Dike Outflow records for 2020 and 2021. As seen in the table, average outflows at the Storage Headworks at the North Dike of Lake Frances approach 161 cfs during the peak month in July. If as estimated, 10% of this flow represents excess flows required to ensure adequate head over the North Dike outlet pipes and sufficient downstream water available within the PCCRC system, an average 16 cfs in excess flow is released. For comparison, PCCRC staff have observed reductions in overnight outflows from the Storage Headworks at the North Dike by as much as 25 cfs due to the Lake Frances water surface drawdown of one foot in elevation that occurs particularly during peak irrigation demands. When compared with this observation, the 16 cfs excess flow estimate appears to be a reasonable value. Complete master flow records are provided in Appendix A.

Table 1. Storage Headworks at North Dike Outflows

Month	2020 Total Outflow (ac-ft)	2021 Total Outflow (ac-ft)	2020-2021 Average Dail Flow (cfs)
October 21-31	0	0	0.0
November	0	0	0.0
December	0	0	0.0
January	0	0	0.0
February	0	0	0.0
March	0	0	0.0
Apr	0	0	0.0
May	85	160	2.0
June	2,520	6,325	74.3
July	9,200	10,605	161.0

Month	2020 Total Outflow (ac-ft)	2021 Total Outflow (ac-ft)	2020-2021 Average Dail Flow (cfs)
Aug	2,535	230	22.5
Sep	1,990	5	16.8
October 1-20	0	0	0.0
Total	16,330	17,325	N/A

b. 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 3a.

c. 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 uppermost piece of infrastructure within the PCCRC system is Swift Dam on Birch Creek Reservoir. Outflows from Swift Dam are highly controlled via a recently installed remote automation and control system at the dam's gate house, and the PCCRC has real-time and continuous capability for flow monitoring and control at that location. The Direct Flow Headworks at Kunkle Drop represents the start of the C-Canal and is located between Swift Dam and Lake Frances. A sharp-crested rectangular weir is located several hundred feet downstream of the Kunkle Drop gates. The Kunkle weir is manually measured using a staff gage that correlates to empirically derived outflow charts. The accuracy of the sharp-crested weir is estimated at +/-5%. The accuracy of sharp-crested weirs is well documented in literature such as the USBR Water Measurement Manual.

Flow measurement at the Storage Headworks at the North Dike of Lake Frances is performed via Sontek IQ ultrasonic meters with built-in pressure transducers. These meters are mounted in two concrete box culverts under Montana Highway 44 which is located immediately north of the Storage Headworks. Flow in this location has an estimated accuracy of +/- 7%.

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

Please see the explanation above in 3c.

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

Yes, annual farm delivery volumes will be reduced by more efficient and timely deliveries, as the implementation of the proposed project will allow the PCCRC to significantly reduce the amount of buffer outflows from the Birch Creek Reservoir and Lake Frances currently required to overcome system inefficiencies. Operating the C-Canal's Direct Flow Headworks currently presents a challenge to the PCCRC operationally with flows diverted into the D-Canal through the Dupuyer Creek Diversion often fluctuating significantly throughout each day due to the natural flow inputs from Dupuyer Creek. Flows turned into the C-Canal at Kunkle Drop are affected by changes in the natural flows within Dupuyer Creek. Further, the long distance and duration between Birch Creek Reservoir (Swift Dam) and the Kunkle Drop creates some uncertainty anticipating the actual quantity of water that arrives at the Kunkle Drop following adjustments to Swift Dam releases. As a result of this uncertainty, the PCCRC has historically been required to release an estimated 30 cubic feet per second (cfs) of water continuously throughout the 150-day irrigation season to ensure adequate flows reach the Kunkle Drop to provide adequate water to downstream water users on the C-Canal.

The outflows at the North Dike gates are similarly impacted by reductions in the pool elevation of Lake Frances during heavy withdrawal periods, as occurs during peak irrigation season. The North Dike Headworks is a low-head outlet. At maximum pool, the water surface is only 12 feet above the invert elevation of the outlet pipes. During peak irrigation use, Lake Frances can drop 12 inches in elevation each day. When discharging hundreds of feet per second from the North Dike into the C-Canal, this magnitude of reservoir pool drawdown can reduce outflows from the North Dike by as much as 25 cfs over the course of a 24-hour period. With PCCRC staff needing to sleep, a significant reduction in flows can occur due to the falling elevation head over the outlet pipes during the overnight hours. The volatility in reservoir pool elevation makes the North Dike Headworks the most difficult structure in the entire PCCRC project to operate.

Because the C-Canal Headworks is difficult to operate, only the most seasoned PCCRC staff can efficiently balance the manual operation of the two C-Canal Headworks locations. Miscalculated or mistimed adjustments at the North Dike can result in drastic water shortages at the end of the 28-mile-long C-Canal system. Flow shortages are a hardship for producers with pumped irrigation systems. To avoid instances where irrigation pumps must be shut off due to flow shortages, excess water must be turned into the C-Canal at the North Dike location at the start of the evening to account for outflow reductions that occur overnight. During operation of the North Dike Storage Headworks, each evening, the District 2E Ditchrider adds 10 to 20 cfs of extra water above the desired C-Canal flow in order to attempt to combat the pressure drop that occurs during the night due to reductions in Lake Frances's surface elevation. PCCRC attempts to time this buffer and scale it such that all deliveries along the C-Canal continue to be satisfied while minimizing the waste out of the end of the C-

canal each day. As a result, daily flow fluctuations within the Main C-Canal resemble a sine wave. Combined with variations in demand from producers within Districts 2E and 2W, operating the Headworks to minimize waste is extremely labor and planning intensive. At times, this practice is also necessary to combat release fluctuations due to variations in flow at the Kunkle Drop location. The District 2E ditch rider, who is responsible for the C-Canal Headworks operations, averages three (3) trips per day to the site over the course of the 150-day irrigation season to make gate adjustments.

With automation systems at the C-Canal Headworks locations, the PCCRC will be able to better manage delivery operations much more efficiently and with more consistent flows within District 2E of the PCCRC system. The project will significantly reduce the strain on PCCRC's resources and operation and maintenance budget and allow the PCCRC to sustain larger water storage volumes further upstream in their system at Birch Creek Reservoir for longer periods each year.

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

The PCCRC maintains detailed water records, and the water savings that result from the proposed project will be quantified and recorded. These records are provided in Appendix A for reference. The PCCRC has begun implementing remote automation projects on critical pieces of infrastructure throughout their water delivery system and have a proven track record in achieving water conservation benefits via the implementation of these automation projects. As of this application's writing, the PCCRC has instituted remote flow monitoring and control capabilities at multiple, critical infrastructure locations including the Swift Dam outlet structure and Kingsbury Turnout. Further, the remote automation of the Dupuyer Creek Diversion structure is currently in progress.

Following implementation of the proposed C-Canal Headworks Automation project, the PCCRC will have the ability to measure flows diverted into the C-Canal in real-time. Once the project is completed, these records will be maintained in the future to validate the proposed water conservation savings. The PCCRC closely monitors snowpack, Birch Creek Reservoir and Lake Frances water levels, Birch Creek and Dupuyer Creek flows, and flows into each canal within their system. With the proposed C-Canal Headworks Automation Project as well as the previously listed automation projects that have been completed, the PCCRC will be able to better forecast the amount of water that will be available and provide drought monitoring tools that can predict current drought conditions. By providing more controls within the system, the PCCRC will be able to be proactive at managing the water within their system rather than being reactive, which will allow the PCCRC to have more water for downstream users when water rationing is being implemented to reduce the overall impact to the system's water users.

(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 PCCRC understands and will agree 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.

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. N/A

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. N/A

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

  See answer to E.1.2.2. below.

- Expected environmental benefits of the renewable energy system

  The wasted water from the PCCRC system has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients in the Marias River. The returned water negatively impacts the Marias River flows when compared to in-stream flows. The proposed project will allow the PCCRC to reduce the higher temperature, sediment, and nutrient laden return flows into the Marias River.

  The proposed C-Canal Headworks Automation Project will lead to the ability to regulate and monitor flows in the C-Canal which will provide substantial water conservation throughout the interconnected network of Birch Creek Reservoir, Birch Creek, and Lake Frances. These areas provide critical aquatic and wetland habitat for the area's fish and wildlife. Notable species that are present within the area's waterways include rainbow trout, brook trout, waterfowl, deer, and grizzly bears. By improving late-season water levels within the Birch Creek Reservoir and Lake Frances, these fish and wildlife species will experience significant preservation benefits. The PCCRC staff will continue to monitor and record reservoir levels within Birch Creek Reservoir and Lake Frances as well as creek flows within Birch Creek. These records will be used to verify anticipated preservation benefits associated with the project.

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

  See answer to E.1.2.2. below.

- Anticipated benefits to other sectors/entities.

Municipal Water Supply Benefits:

The proposed project will allow the PCCRC to significantly reduce or eliminate excess outflows from the Storage Headworks at the North Dike of Lake Frances. As previously indicated, the project will allow for the reduction in North Dike outflows by 10% of the total outflows. PCCRC water records from 2020 and 2021 indicate that the estimated water savings will amount to 1,680 acre-feet per year within Lake Frances alone. By providing remote automation and control of the C-Canal Headworks, the proposed project will allow the PCCRC to improve water levels within Lake Frances, and therefore, preserve and safeguard the main source of municipal water for the communities of Valier, Conrad, and Brady, MT. Preservation benefits will be directly correlated with water savings, and the water savings will be quantified and recorded by PCCRC staff. The benefit is expected to accrue over the 30-year design life of the project, and the preservation benefits will be documented via annual PCCRC water recording.

Economic Benefits:

The proposed C-Canal Headworks Automation project will improve water delivery efficiency and water conservation efforts throughout the PCCRC's irrigation system. The proposed project will provide the PCCRC staff with the ability to remotely monitor and control inflows and outflows into the C-Canal, and as a result, the project will conserve an estimated 4,462 acre-feet of water at the head of the irrigation season to augment late-season flows to the system's water users. Calculations and documentation of this water savings estimate are provided in prior sections of this grant application. The 4,462 acre-feet of water savings achieved within the Birch Creek Reservoir will result in an increased water allotment of 0.74 inch for each of the 72,000 irrigated acres on an annual basis. The 0.74-inch increase in allotment represents a 7% increase in water provided to the entire system, correlating to a 7% increase in crop production for the 72,000 acres. Crops produced throughout the PCCRC system include alfalfa hay, barley, wheat, canola, and peas.

Conversations with the PCCRC indicate that the crops grown throughout the PCCRC's service area are distributed state- and region-wide, therefore impacting a wide range of people within the State of Montana and beyond. The proposed project will have a far-reaching positive impact on the citizens 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.

Public Welfare Benefits:

The PCCRC's proposed C-Canal Headworks Automation Project will provide a direct and substantial benefit to the welfare of the area's citizens as well as the local economy. The proposed project will sustain agricultural activities and increase crop production throughout the PCCRC's irrigation system. Short-term economic benefits will occur via short-term work, trucking, and supply purchases that will be required for the project's construction.

- 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.

  The proposed project will reduce greenhouse gas emissions, and therefore offset the impacts of climate change via two ways. In the first way, the additional water that is conserved within the PCCRC's reservoirs that will be available to augment late-season flows to the system's water users will allow for increased crop production throughout the PCCRC's service area. The additional crop production will improve vegetative cover throughout the systems irrigated acres which will sequester more carbon than currently possible. The second method of greenhouse gas emission reduction involves the reduction in PCCRC operation and maintenance trips to the C-Canal headworks locations. The PCCRC will not have to make as many trips to both the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at the North Dike of Lake Frances in order to effectively manage water operations. The reduction in trips will reduce the vehicle miles travelled, burn less fuel, and lower carbon dioxide emissions from PCCRC vehicles.

- 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.

  Currently, both C-Canal Headworks can only be operated on-site by PCCRC staff. This requires numerous daily trips to both structures to check water flows and make necessary adjustments to the gate positions. This daily travel is inefficient and has become unnecessary as technology has advanced in recent years. Because the C-Canal Headworks is difficult to operate, only the most seasoned

PCCRC staff can efficiently balance the manual operation of the two C-Canal Headworks locations. Miscalculated or mistimed adjustments at the North Dike can result in drastic water shortages at the end of the 28-mile-long C-Canal system. Flow shortages are a hardship for producers with pumped irrigation systems. To avoid instances where irrigation pumps must be shut off due to flow shortages and to allow PCCRC staff to sleep overnight, excess buffer water must be turned into the C-Canal at the North Dike location at the start of the evening to account for outflow reductions that occur overnight. On average, PCCRC staff is required to make trips to the C-Canal Headworks sites three (3) times per day during the irrigation season. With automation systems at both C-Canal Headworks locations as proposed for this project, the PCCRC will be able to manage delivery operations much more efficiently within the upper portion of the PCCRC system. The project will significantly reduce the strain on PCCRC's resources and operation and maintenance budget. The hours saved by significantly reducing these trips can be utilized to provide additional operations and maintenance (O&M) services for the PCCRC system at other locations.

The reduction in O&M trips to the site would reduce the number of 10-mile roundtrips from Valier to the headworks locations. Current operations require approximately three (3) trips to the site each day during the irrigation season, and one (1) trip per day during the off-season. The proposed project would allow these trips to be reduced to one (1) trip per day during the irrigation season and one (1) trip every other day during the offseason. In total, the proposed project would reduce the number of trips to the headworks locations from an estimated 665 trips to approximately 258 trips per year for PCCRC staff. This reduction in trips will reduce PCCRC staff mileage by 4,070 miles annual. The Environmental Protection Agency's CO2 emissions per mile estimate for an average passenger vehicle is 404 grams of CO_2/mile. Based on this emissions estimate, the proposed project will reduce the PCCRC's carbon footprint by approximately 1,644,280 grams of CO2 (1.64 metric tons) annually.

- 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).

The PCCRC's previous automation and control projects at the Kingsbury Turnout and currently under-construction Dupuyer Creek Diversion Automation Project use small-scale solar panels to power remote flow monitoring devices. As with these prior projects, the proposed remote monitoring and control components associated with the C-Canal Headworks Automation Project will include solar panels to assist in providing power for the monitoring components.

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:

The proposed irrigation system automation and control project improvements will provide a significant water savings of a 15 cfs reduction in excess flows from Birch Creek Reservoir over the PCCRC's 150-day irrigation season. This water savings amounts to 4,462 acre-feet of water remaining in Birch Creek Reservoir as storage later in the irrigation season. The improvement in late season storage at Birch Creek Reservoir will significantly improve the PCCRC system's drought resiliency. The proposed project will also allow the PCCRC to conserve water within Lake Frances by providing real-time, remote automation and control of outflows of at the Storage Headworks at the North Dike of Lake Frances. The two latest water years shows that approximately 16,800 acre-feet of water are released at the North Dike location each year. The PCCRC estimates that 10% of the total release at the North Dike represents excess outflows that are necessary to ensure adequate head is over the outlet pipes which compensates for the variable water surface elevation within Lake Frances. This estimate is based on actual flow records from the North Dike and actual demand downstream. The excess release amounts to an average of 1,680 acre-feet per year. With the automation of the Storage Headworks, flow measurements and controls would be able to be made remotely and automatically. As a result, this 10% excess flow would be able to be eliminated, thus conserving an estimated 1,680 acre-feet of water each year within Lake Frances. By providing more controls at each C-Canal Headworks location, the PCCRC will be able to be proactive at managing the water within the system rather than reactive. The PCCRC will have more water for downstream users, particularly during late season irrigation periods and when drought conditions are present.

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

  The proposed C-Canal Headworks Automation Project will improve the PCCRC system's ecological resiliency to climate change through the conservation of water, particularly in the upper portions of the irrigation system. With respect to agricultural production in the north-central Montana area, climate change has generally caused winter periods to shorten which results in spring runoff occurring earlier than previous decades. These changes are documented in the 2017 Montana Climate Assessment located at the following link: https://montanaclimate.org. With earlier runoffs, river flows peak and then diminish earlier in the season and often result in water-short periods during the later summer months when peak irrigation demands occur.

In the PCCRC's case, the best way to improve drought resiliency within the system at-large is to maintain larger storage volumes within the Birch Creek Reservoir as late as possible throughout the irrigation season. The Birch Creek Reservoir is the uppermost point within the irrigation system. With the requirement that the same water allocation be provided to all irrigated acres within the system regardless of position within the system, the availability of water in the Birch Creek Reservoir represents the limiting factor in the water allocation to all 72,000 irrigated acres within the PCCRC system. With the proposed C-Canal Headworks Automation Project, the PCCRC will be able to reduce excess releases from the Birch Creek Reservoir from 30 cfs excess to 15 cfs excess. This 15 cfs reduction in excess flows from Birch Creek Reservoir over the 150-day irrigation season amounts to a water savings of 4,462 acre-feet of water remaining in Birch Creek Reservoir as storage for later in the irrigation season. The improvement in late season storage at this location will significantly improve the PCCRC system's drought resiliency.

- 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).

  The implementation of the proposed C-Canal Headworks Automation project will provide substantial irrigation system efficiencies within the PCCRC system by providing remote flow measurement and gate operation capabilities for the C-Canal. These improved efficiencies will allow for excess flows from both the Birch Creek Reservoir and Lake Frances to be meaningfully reduced, thus allowing for higher reservoir levels later in the irrigation season. The fisheries, aquatic habitats, and general water levels within each reservoir will directly benefit from these later season reservoir level increases.

- 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).

  As previously stated, the proposed project will allow the PCCRC to maintain higher water levels within the Birch Creek Reservoir and Lake Frances by reducing excess releases from each water body to overcome operational inefficiencies within the PCCRC irrigation system. The proposed C-Canal Headworks Automation Project will lead to the ability to regulate and monitor flows in the C-Canal which will provide substantial water conservation throughout the interconnected network of Birch Creek Reservoir, Birch Creek, and Lake Frances. These areas provide critical aquatic and wetland habitat for the area's fish and wildlife. Notable species that are present within the area's waterways include rainbow trout, brook trout, waterfowl, deer, and grizzly bears. By improving late-season water levels within the Birch Creek Reservoir

and Lake Frances, these fish and wildlife species will experience significant benefits.

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

  Currently, excess releases from Birch Creek Reservoir are direct to Lake Frances and the C Canal system. From Lake Frances, excess releases at the Storage Headworks at the North Dike are released into the C-Canal system. From the C-Canal system, the PCCRC estimates that of the majority of the excess releases are lost to spill water at the end of the C-Canal, which flows into a tributary to the Marias River approximately 2 miles upstream of the river. Any returned water to the Marias River has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients within the river. The return flows spill into the Marias River tributary at a high-gradient location which are subject to increased erosion when large amounts of water pass through. The proposed project will allow minimize spills within the PCCRC system will provide an optimal condition for the tributary that carries this excess water to the Marias River. The reduction in erosion at the end of the C-Canal will allow the tributary to establish vegetation and promote a healthy riparian ecosystem for fish and wildlife habitat.

- 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?

  Over the past decade, climate change and drought conditions have had significant impact on the PCCRC system and its water users. Sustained drought conditions along with earlier spring runoff have caused significant stress in maintaining efficient operation of the PCCRC system. Water stored within the Birch Creek Reservoir reaches each of the 72,000 irrigated acres within the system. The PCCRC Board has a firm policy that shareholders in each of their five (5) districts be allotted the exact same amount of water, regardless of their location within the PCCRC's system. Typically, the limiting factors in this equation are District 1 which is nearest to Swift Dam and highest in elevation as well as District 2 which is serviced by both Lake Frances and Swift Dam. However, District 2 can only be supplied with water from the North Dike at Lake Frances if the lake elevation is above the outlet. If the PCCRC has a dry year, or storage in Lake Frances is low, District 2 can only be serviced by Swift Dam. The result of these geographical limiting factors is that the more water that is available at Birch Creek Reservoir during the later portions of the irrigation season, the more water the PCCRC can provide to the entire five-district system at large. The proposed automation project will allow the PCCRC to maintain additional water storage at the highest point within the PCCRC irrigation system each year which will allow for an additional water allotment to be made available throughout the PCCRC system.

  The proposed project will allow for the conservation of 4,462 acre-feet of water to be held in the Birch Creek Reservoir for use later in the irrigation season.

This increase in water savings will result in an approximately 0.74-inch increase in annual water allotment per acre to be applied throughout the system's 72,000 irrigated acres. The current three-year average water allotment for these acres is 10 inches, and an increase of 0.74 inches represents an approximate 7% increase in water allotted per acre.

The proposed C-Canal Headworks Automation Project will allow PCCRC staff to observe flows remotely at each headworks site, control downstream C-Canal flows, and will prevent waste spills from occurring. The proposed improvements will allow the PCCRC to manage and adjust flows continually throughout each day of the irrigation season to meet real-time demand. The proposed improvements will provide PCCRC with the tools to effectively manage the water resource and be able to make decisions on where the 6,142 acre-feet of conserved water will go (left in the storage reservoirs or put to beneficial use). Water use efficiency and overall management will be tracked by the PCCRC through water measurements, deliveries, and crop production.

PCCRC staff estimate that a combined minimum of four (4) hours per day is spent by PCCRC personnel each day of the 150-day irrigation season, traveling to the site and monitoring and adjusting flows at the C-Canal Headworks locations. During the off-season, PCCRC staff spend roughly one (1) hour per day monitoring activities at the two headworks locations. As a result, the total time spent by PCCRC staff for general C-Canal Headworks operations is estimated at 815 hours, annually. Based on prior automation project experience, PCCRC staff estimate a fully automated C-Canal Headworks project reducing the required O&M time spent at the headworks locations to only one (1) hour per day during the 150-day irrigation season and one (1) hour every other day during the off-season. O&M time at the headworks locations will not completely disappear with a fully automated system, as staff will still need to maintain a cursory visual inspection of the headworks locations for gate and structure damage and the presence of debris. The annual O&M time anticipated following implementation of the automation project is approximately 258 hours each year. When compared with the current 815 hours, a reduction of 557 in O&M hours for PCCRC staff will be achieved through the implementation of the C-Canal Headworks Automation Project.

Further, the reduction in trips to the site would reduce the number of 10-mile roundtrips from Valier to the headworks locations. Current operations require approximately three (3) trips to the site each day during the irrigation season, and one (1) trip per day during the off-season. The proposed project would allow these trips to be reduced to one (1) trip per day during the irrigation season and one (1) trip every other day during the offseason. In total, the proposed project would reduce the number of trips to the headworks locations from an estimated 665 trips to approximately 258 trips per year for PCCRC staff.

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 PCCRC currently monitors flows within their irrigation system as well as water levels and stream flows within the Birch Creek Reservoir, Birch Creek, and Lake Frances on a continual basis. These records will continue to be kept following the proposed C-Canal Headworks Automation Project to track the improvements in water efficiency and improved streamflow that will occur outside periods of peak irrigation demand when the PCCRC need to pull 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.

  Climate change has significantly impacted water sustainability in north-central Montana in recent years. Sustained periods of drought are present, winter months have shortened, snowpack has reduced, and spring runoff has trended earlier than previous decades as documented in the 2017 Montana Climate Assessment (link: https://montanaclimate.org). As a result of these changes, creek and river flows fall off earlier than previous seasons, limiting late-season water availability to irrigators during the hotter summer months of July, August, and September. Major findings of the 2017 Montana Climate Assessment (link: https://montanaclimate.org) 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 PCCRC's interruptions in service occur in the form of reduced water allotments during the later summer periods which coincide with peak irrigation season. The reduced allotments are caused by lower water storage levels within

Birch Creek Reservoir which are the result of earlier runoff, lower snowpack, and current requirement to release more water from Birch Creek Reservoir than is required to overcome delivery inefficiencies. The PCCRC will need to operate their system in the most efficient manner possible to mitigate reduced water allotments going forward, and the proposed C-Canal Headworks Automation Project will serve this purpose.

- 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 PCCRC's most effective defense at countering the effects of climate change and extended periods of drought is to maximize water operation efficiencies in the irrigation system. The proposed C-Canal Headworks Automation Project will provide the PCCRC with the ability to reduce water releases from Birch Creek Reservoir by 15 cfs over the course of the entire 150-day irrigation season. By reducing the rate of water release from the reservoir, the PCCRC will be able to maintain higher water levels within the reservoir for potential use later in the irrigation season. Maintaining the largest possible volume of water at the highest point within the irrigation system, the PCCRC will have far greater flexibility in water operations and supplying irrigation deliveries to water users within the system.

- 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 will allow water to remain in Birch Creek Reservoir and Lake Frances for longer periods each year. During periods of peak irrigation demand, the PCCRC water users experience reductions in water allocations due to a lack of available water in these two storage reservoirs, and these allotment reductions are particularly acute during periods in the late summer months. The water conserved in these reservoirs as a result of the C-Canal Headworks Automation Project will be used to increase allotments later in the irrigation season to combat water shortages.

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

  The proposed C-Canal Headworks Automation Project will allow PCCRC staff to operate the headworks gates remotely, observe flows remotely, and will prevent waste spills from occurring. The proposed improvements will allow the PCCRC to manage and adjust flows continually throughout each day of the irrigation season to meet real-time demand. The proposed improvements will provide PCCRC with the tools to effectively manage the water resource and be able to make decisions on where the 6,142 acre-feet of conserved water will go (left in the storage reservoirs or put to beneficial use).

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

  By implementing the C-Canal Headworks Automation Project, the PCCRC will have greater flexibility to effectively manage water resources throughout the PCCRC system. Between the Birch Creek Reservoir and Lake Frances, the C-Canal Headworks Automation Project will provide an estimated 6,142 acre-feet of conserved water which will be available to remain in the storage reservoirs or put to beneficial use.

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 proposed C-Canal Headworks Automation Project will improve the PCCRC system's ecological resiliency to climate change through the conservation of water, particularly in the upper portions of the irrigation system. With respect to agricultural production in the north-central Montana area, climate change has generally caused winter periods to shorten which results in spring runoff occurring earlier than previous decades. These changes are documented in the 2017 Montana Climate Assessment (link: https://montanaclimate.org). With earlier runoffs, river flows peak and then diminish earlier in the season and often result in water-short periods during the later summer months when peak irrigation demands occur.

  In the PCCRC's case, the best way to improve drought resiliency within the system at-large is to maintain larger storage volumes within the Birch Creek Reservoir as late as possible throughout the irrigation season. The Birch Creek Reservoir is the uppermost point within the irrigation system. With the requirement that the same water allocation be provided to all irrigated acres within the system regardless of position within the system, the availability of water in the Birch Creek Reservoir represents the limiting factor in the water allocation to all 72,000 irrigated acres within the PCCRC system. With the proposed C-Canal Headworks Automation Project, the PCCRC will be able to reduce excess releases from the Birch Creek Reservoir from 30 cfs excess to 15 cfs excess. This 15 cfs reduction in excess flows from Birch Creek Reservoir over the 150-day irrigation season amounts to a water savings of 4,462 acre-feet of water remaining in Birch Creek Reservoir

as storage for later in the irrigation season. The improvement in late season storage at this location will significantly improve the PCCRC system's drought resiliency.

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

  Yes, the proposed improvements will reduce the amount of water released from the Birch Creek Reservoir (Swift Dam) and Lake Frances throughout the irrigation season and allow the PCCRC to have greater flexibility in providing water deliveries to water users during late-season irrigation periods. This flexibility improves the sustainability of the water supply. Climate change has significantly impacted water sustainability in north-central Montana in recent years. Sustained periods of drought are present, winter months have shortened, snowpack has reduced, and spring runoff has trended earlier than previous decades as documented in the 2017 Montana Climate Assessment (link: https://montanaclimate.org). As a result of these changes, creek and river flows fall off earlier than previous seasons, limiting late-season water availability to irrigators during the hotter summer months of July, August, and September.

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

  N/A

- Will the project result in lower greenhouse gas emissions?

  The proposed project will reduce greenhouse gas emissions, and therefore offset the impacts of climate change via two ways. In the first way, the additional water that is conserved within the PCCRC's reservoirs that will be available to augment late-season flows to the system's water users will allow for increased crop production throughout the PCCRC's service area. The additional crop production will improve vegetative cover throughout the systems irrigated acres which will sequester more carbon than currently possible. The second method of greenhouse gas emission reduction involves the reduction in PCCRC operation and maintenance trips to the C-Canal headworks locations. The PCCRC will not have to make as many trips to both the Direct Flow Headworks at Kunkle Drop and the Storage Headworks at the North Dike of Lake Frances in order to effectively manage water operations. The reduction in trips will reduce the vehicle miles travelled, burn less fuel, and lower carbon dioxide emissions from PCCRC vehicles.

(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

The Birch Creek Channel is located at the natural southern boundary of the Blackfeet Reservation. As part of the federally ratified Blackfeet Compact, the PCCRC is responsible for passing natural Birch Creek base flows through Swift Dam, through the diversion, and downstream to the Blackfeet Nation via the BIA Irrigation Project. The PCCRC delivers water to the Blackfeet Tribe via the BIA's Badger Fischer Irrigation Project. The timely, efficient operation of flows out of Birch Creek Reservoir (Swift Dam) is a critical component in satisfying the requirements of the Blackfeet Compact and the Birch Creek Agreement. The C-Canal Headworks Automation project will provide the PCCRC with the ability to better manage outflows from Birch Creek Reservoir (Swift Dam) and will serve an important role in building a cooperative and productive working arrangement between PCCRC and the Blackfeet Tribe moving forward.

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?

Yes, the proposed improvements will reduce excess releases of water from Birch Creek Reservoir (Swift Dam) throughout the irrigation season and allow the PCCRC to have greater flexibility in providing water deliveries not only throughout the PCCRC's irrigated acres but also ensuring natural base flows within Birch Creek are passed on downstream to the Blackfeet Tribe via the BIA's Badger Fischer Irrigation Project. This flexibility improves the sustainability of the water supply.

(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 Birch Creek Channel is located at the natural southern boundary of the Blackfeet Reservation. As part of the federally ratified Blackfeet Compact, the PCCRC is responsible for passing natural Birch Creek base flows through Swift Dam, through the diversion, and downstream to the Blackfeet Nation via the BIA Irrigation Project. The PCCRC delivers water to the Blackfeet Tribe via the BIA's Badger Fischer Irrigation Project. The timely, efficient operation of flows out of Birch Creek Reservoir (Swift Dam) is a critical component in satisfying the requirements of the Blackfeet Compact and the Birch Creek Agreement.

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

Along with the water conservation, irrigation system management, and agricultural development benefits outlined previously in this grant application, the proposed project will benefit municipal water, environmental, and recreation sectors as well. The proposed C-Canal Headworks Automation Project will lead to the ability to regulate and monitor flows in the C-Canal which will provide substantial water conservation throughout the interconnected network of Birch Creek Reservoir, Birch Creek, and Lake Frances. These areas provide critical aquatic and wetland habitat for the area's fish and wildlife.

Lake Frances serves as the primary source of municipal water for the Town of Brady and City of Conrad. Water is pumped to each community via an intake at the southeast portion of the lake. Further, the Town of Valier's municipal water supply is sourced to groundwater wells that are likely influenced by Lake Frances water levels. As the municipal water supply to the area's communities, the preservation of Lake Frances water levels provides potable water for residential and commercial use as well as fire protection.

The implementation of the proposed C-Canal Headworks Automation project will provide substantial irrigation system efficiencies within the PCCRC system by providing remote flow measurement and gate operation capabilities for the C-Canal. These improved efficiencies will allow for excess flows from both the Birch Creek Reservoir and Lake Frances to be meaningfully reduced, thus allowing for higher reservoir levels later in the irrigation season. The fisheries, aquatic habitats, and general water levels within each reservoir will directly benefit from these later season reservoir level increases. Each water body, along with Birch Creek, are popular recreational destinations for camping, hiking, wildlife viewing, fishing, and various other outdoor activities.

The proposed project will provide water conservation, irrigation system management, agricultural production, wildlife habitat, and recreation. The proposed project will provide water via conservation that can be used for agriculture, downstream industrial use (as allowed within the PCCRC water rights), environmental uses such as the preservation of fish and wildlife habitat, and to facilitate recreation and navigation in Birch Creek, Dupuyer Creek and the downstream Marias River.

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

The proposed project represents a continuation of the PCCRC's drive to automate the most critical pieces of water delivery infrastructure. For the last decade, the PCCRC has worked to upgrade and automate its irrigation system. Using a Water Conservation Plan (WCP) and Capital Improvements Planning (CIP) document as a framework, the PCCRC has taken proactive steps to implement irrigation improvement projects consistent with their ongoing water management, conservation, and drought resilience planning. For reference, a portion of the PCCRC's 2022 Water Conservation Plan is provided in Appendix B.

With respect to automation projects alone, the Pondera County Canal & Reservoir Company began implementing a long-term goal to automate its critical delivery facilities beginning in 2012. The first step in this process was the addition of telemetric control at the East Dam on Lake Frances. Over the following nine irrigation seasons, this pilot system has consistently regulated reservoir outflows for the direct benefit of more than 45,000 acres of cropland. Building on that initial success, the PCCRC added the following monitoring and instrumentation and telemetric gate controls, which have further improved operational control and delivery efficiency:

- 2014 C-Canal (North Dike) Sonar Flowmeters
- 2016 D-Canal Sonar Flowmeter
- 2017 P Canal Sonar Flowmeter
- 2019 K Canal Sonar Flowmeter

- 2020 NOAA-grade Automated Weather Stations at both Valier and Swift Dam
- 2020 Swift Dam Outlet Gates
- 2020 Kingsbury Diversion

Automation of the Dupuyer Creek Diversion (headworks of the D-Canal) is currently being constructed as of the summer of 2022. Additional SCADA Work priorities within the PCCRC's capital improvement planning (CIP) document includes automated control of:

- C-Canal Headworks & North Dike Gates (This Project)
- Birch Creek Diversion Structure
- Dry Fork Diversion Structure
- S-K Diversion Structure
- Big Flat Coulee Siphon (Data Transmission Only)
- The P-P6 Diversion Structure.

Each of these projects will address the sustainability of the water supply and allow the PCCRC to reduce or 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?

The PCCRC has recently undergone the strenuous and resource intensive water rights adjudication process. This process is nearing completion at the time of this application's writing. The proposed C-Canal Headworks Automation Project will assist the PCCRC in managing the critical water resources within the Birch Creek and Dupuyer Creek drainages.

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 Dupuyer Creek Diversion location is located just upstream of the C-Canal Headworks locations within the PCCRC system. In 1985, the existing Dupuyer Creek Diversion was rehabilitated in collaboration with the USDA SCS (now the NRCS) as part of the Lower Birch Creek Watershed Plan. Through this partnership, the previous diversion was replaced with a new concrete structure, emergency flood conveyance, parapet floodwalls, and high-strength hand-operated Waterman bulkhead-style gates. The structural components implemented during that work are still in excellent shape. The PCCRC's Engineer estimates that the existing concrete diversion will be serviceable and fully operate for at least 50 years into the future.

      Between 1980 and 1990, the PCCRC and the NRCS worked together to implement millions of dollars of other critical infrastructure replacement and repairs across the Pondera County Canal & Reservoir Company's then aging systems. These projects were part of the collaborative Lower Birch Creek Watershed Plan through the (then) Soil Conservation Service.

      In addition, the State of Montana and the Federal Government have developed multiple programs for the promotion of renewable resource conservation on a more producer-focused level. These programs generally target projects in which a need is demonstrated, including the demonstration of an increase in citizen and resource benefits. The Montana NRCS EQIP program is an example of one of these programs and provides cost share money for projects that increase resource conservation (although now changed to be implemented through Targeted Implementation Plans). Over the past 15 years, dozens of irrigators within the Company's service area have pooled resources with PCCRC (matching their cash funds with the Company's in-kind staff and equipment contributions) in order to make on-farm improvements using the NRCS EQIP program. The additional water

saved by the proposed telemetry and automation project will further promote efforts by PCCRC users to seek assistance from the NRCS (and other funding sources) for on-farm improvements. In addition, the proposed telemetry work—once implemented—will free PCCRC resources that could instead be used in partnership with local producers to help implement EQIP (and other) projects.

- 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 area's 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 PCCRC 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.

  No documentation was available from the local NRCS regarding on-farm projects within the PCCRC service area that are eligible for NRCS assistance. We are not aware of any request for technical or financial assistance from the NRCS at the present time, but the PCCRC users remain open to potential support through NRCS programs.

- 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 C-Canal Headworks Automation Project will prevent water shortages through the mitigation of 6,142 acre-feet per year of wasted flows due to the current requirement to release excess flows from the Birch Creek Reservoir and Lake Frances to overcome operational inefficiencies within the PCCRC system. The proposed project will allow the PCCRC to maintain real-time, remote flow measurement and control of flows into the C-Canal at both the Direct Flow Headworks at Kunkle Drop as well as the Storage Headworks at the North Dike of Lake Frances. The project will serve to support efficient on-farm practices such as center pivot irrigation.

OR

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

  The proposed C-Canal Headworks Automation Project will maximize efficiency in this area by providing mitigation to conserve 6,142 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.

    The proposed headworks automation project 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 PCCRC's water service area boundaries has been provided as Exhibit 5.

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.

Through their Water Conservation Plan (WCP) and capital improvements plan (CIP) document, the PCCRC has taken proactive steps to implement irrigation improvements consistent with their ongoing water management, conservation, and drought resilience planning. For reference, a portion of the PCCRC's 2022 Water Conservation Plan is provided in Appendix B.

Many aspects of the PCCRC's Water Conservation Plan adhere directly to the Montana State Water Plan and Drought Response Plan. The Montana Drought Response Plan and the Montana State Water Plan are attached to this application. The Montana Drought Response Plan is available at the following link:http://dnrc.mt.gov/divisions/water/drought-management/montana-drought-management-plan-mdmp-update, and the Montana State Water Plan is available at the link: http://dnrc.mt.gov/divisions/water/management/state-water-plan. For reference, page 67 of the Montana State Water plan identifies water use efficiency and water conservation as one of the primary goals and key recommendations to address water supply and demand in Montana. The proposed C-Canal Headworks Automation Project will provide the PCCRC with further capabilities in pursuit of these goals and 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 to address water supply and 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.

With respect to automation projects alone, the Pondera County Canal & Reservoir Company began implementing a long-term goal to automate its critical delivery facilities beginning in 2012. The first step in this process was the addition of telemetric control at the East Dam on Lake Frances. Over the following nine irrigation seasons, this pilot system has consistently regulated reservoir outflows for the direct benefit of more than 45,000 acres of cropland. Building on that initial success, the PCCRC added the following monitoring and instrumentation and telemetric gate controls, which have further improved operational control and delivery efficiency:

- 2014 C-Canal (North Dike) Sonar Flowmeters

- 2016 D-Canal Sonar Flowmeter
- 2017 P Canal Sonar Flowmeter
- 2019 K Canal Sonar Flowmeter
- 2020 NOAA-grade Automated Weather Stations at both Valier and Swift Dam
- 2020 Swift Dam Outlet Gates
- 2020 Kingsbury Diversion

Automation of the Dupuyer Creek Diversion (headworks of the D-Canal) is currently being installed at the time of this grant application's writing. Additional SCADA Work priorities within the PCCRC's capital improvement planning (CIP) document includes automated control of:

- C-Canal Headworks & North Dike Gates (This Project)
- Birch Creek Diversion Structure
- Dry Fork Diversion Structure
- S-K Diversion Structure
- Big Flat Coulee Siphon (Data Transmission Only)
- The P-P6 Diversion Structure.

(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 proposed C-Canal Headworks Automation Project will significantly increase the PCCRC's ability to manage the water resource. The project is fully located within the August 2021 Missouri Headwaters Basin Study which is a completed WaterSMART Basin Study (https://www.usbr.gov/watersmart/bsp/docs/finalreport/Missouri/MissouriBasinStudyFinalReport.pdf). As identified on Page 121 of this study, collective goals for developing drought preparedness plans and long-term mitigation strategies in the Missouri Headwaters includes "initiate local projects to build regional drought resiliency." The proposed improvements will provide the PCCRC the ability to control and monitor water being delivered to the downstream system and reduce waste spills. The proposed improvements will allow the PCCRC to manage and adjust flows continually throughout each day of the irrigation season to meet real-time demand. The proposed improvements will provide PCCRC with the tools to effectively manage the water resource and be able to make decisions on where the 6,142 acre-feet of conserved water will go (left in the storage reservoirs or put to beneficial use).

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 C-Canal Headworks Automation Project will consist of the following tasks:

  - Planning/Contracting – 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 headworks locations will be inspected, proposed weir locations surveyed, and measurements taken to gather the baseline data required for the design of the automation and control systems.
  - Design – The proposed SCADA system and flow monitoring weir designs will be designed to accommodate operational requirements. Plans and specifications developed and submitted to PCCRC 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 PCCRC and Reclamation. Permitting will include environmental and cultural resource compliance.
  - Construction – A licensed contractor selected via applicable public procurement process requirements will be selected and will install the SCADA system according to the plans and specifications. PCCRC crews will complete construction of new concrete flow measurement weirs at each headworks location.
  - Construction Administration – An 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 new SCADA system and flow measurement weirs. A construction completion report will be submitted to PCCRC and Reclamation.

- Construction and Grant Close-Out – The PCCRC 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 PCCRC 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 PCCRC 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:

  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 project 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 proposed concrete flow measurement weirs that will be used in combination with the proposed SCADA system. The engineer will further assist the PCCRC in developing plans and specifications and facilitating the public bid

process for the SCADA system procurement and installation portions of the project.

- 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
Project Kickoff Meeting	July 2023
Project Site Survey	August 2023
Project Design	Sept 2023 – March 2024
Environmental/Cultural Resource Compliance	Nov 2023 – March 2024
PCCRC and Reclamation Plans Review	February 2024 – March 2024
Final Plans & Specifications	March 2024
SCADA system Public Bidding	March 2024-April 2024
Order Materials*	May 2024
Begin Construction	May 2024
Mid-Point Construction (50%)	November 2024
End Construction (100%)	April 2025
Construction Administration	May 2024 – April 2025
Construction Closeout	April 2025
As-Built Verification	May 2025
Construction Completion Report	June 2025
Grant Closeout	July 2025
Project Completion	July 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 PCCRC 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), 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 PCCRC 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 PCCRC Board, the Pondera County Conservation District, and communities of Valier and Conrad, MT have all shown support for this project. The PCCRC Board will make financial, manpower, equipment, and material purchasing decisions as well as provide overall management of the project. The Pondera County Conservation District, Valier and Conrad, MT communities, and local water users have been consulted on the project and will continue to be consulted throughout the project.

- What is the significance of the collaboration/support?

  The Pondera 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 information will be shared with the other conservation districts who in turn will share this information with nearly all the remaining irrigation districts and water user associations throughout the State of Montana.

  The Valier and Conrad, MT communities support the proposed project as the project will directly benefit water supplies in Lake Frances. Lake Frances provides municipal water supplies to each community, and the preservation of the water supply is of great importance to each community.

- 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, and the Montana Association of Conservation Districts provides a large audience to share this information with, in order for them to learn from the project and evaluate remote monitoring and control projects for a number of irrigation districts and water users' associations throughout Montana.

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

  Letters of support are attached as Appendix C.

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 PCCRC is proposing to contribute $253,343.42 in cash reserves and in-kind work of the total $496,751.80 project cost. This equates to the PCCRC contributing 51% of the total project budget.

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:

  Although the PCCRC is neither a Reserved Works nor a Transferred Works facility, they have worked with the Bureau of Reclamation (Reclamation) since Reclamation rebuilt Swift Dam following the 1964 flood disaster. The PCCRC owns and operates Swift Dam, but Reclamation provides remote stage-storage monitoring and technical assistance on an as-needed basis. Reclamation previously operated and maintained Hydromet stations at both Lake Frances and Swift Reservoir; both are a part of the PCCRC system. While these hydromet stations have not functioned since 2018 and 2019, respectively, the PCCRC hopes to explore a continued partnership with Reclamation for the future reporting of these sites. Additionally, the PCCRC and BOR worked together in 2019-2021 to implement and administer funds for the construction of the E-Canal Regulating Reservoir within the PCCRC system.

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

  The PCCRC does not receive Reclamation project water

- If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means? No

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

Yes. The project is situated in the upper Marias River watershed and upstream of Tiber Reservoir, which is associated with Reclamation. The C-Canal Headworks Project is positioned off of Dupuyer Creek. Dupuyer Creek flows into Birch Creek downstream of the Dupuyer Creek Diversion structure. Birch Creek later flows into the Two Medicine River. Even farther downstream, the Two Medicine River feeds into the Marias River. The proposed project has the potential to conserve water in the Marias River. Therefore, the operation of the C-Canal Headworks locations will benefit Reclamation's project at the Tiber Reservoir.

- 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 PCCRC maintains detailed, daily water records for each component of the irrigation system. The water savings will be verified by the flow records out of Birch Creek Reservoir (Swift Dam), flow records at the Direct Flow Headworks at Kunkle Drop, and flow records at the Storage Headworks at the North Dike of Lake Frances. Comparisons will be made of released flows post-project to prior yearly records to validate the proposed water conservation savings.

The newly installed remote monitoring and control components will tie into the PCCRC's current SCADA monitoring system that is currently in place and providing flow measurements at other locations within the system. The PCCRC has been using this technology with great success over the past decade. The technology is not new and has been proven effective for control and operation of irrigation infrastructure. The proposed improvements will allow the PCCRC to control and monitor flows precisely into the C-Canal.