WaterSMART Grant

Water and Energy Efficiency Grant for Fiscal Year 2023

Funding Opportunity Announcement No. R23AS00008

Lower Yellowstone Irrigation Project Critical Structures Rehabilitation Project

WWC ENGINEERING

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D.2.2.2 TECHNICAL PROPOSAL CONTENT

EXECUTIVE SUMMARY

The executive summary should include:

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

  Date: June 29, 2022
  Applicant Name: *Lower Yellowstone Irrigation Project*
  Address: *2327 Lincoln Avenue SE, Sidney, MT 59270 (Richland 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 Lower Yellowstone Irrigation Project is a Category A Applicant

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

  The Lower Yellowstone Irrigation Project is proposing to replace two concrete irrigation structures which include two major lateral headgate structures. The headgate structures are designated as Lateral K and Lateral PP headgates. Both structures are old deteriorated concrete structures that leak water significantly, contributing to a significant overall loss within the LYIP system that creates management difficulties particularly during times of lower river flows and peak water use. Management difficulties lead to a combination of water shortages to crops or too much water in the irrigation system and excessive water wasted back to the Yellowstone River. The inability to control water levels efficiently has led to the rationing of water during peak irrigation periods and/or diverting excess water in order to ensure delivery to all users in the system, neither being very efficient. The proposed improvements will conserve up to 1,560 acre-feet of water per year due to the inability to control water levels in the canal system. The existing drought conditions in eastern Montana were considered extreme to exceptional by the U.S. Drought Monitor in 2021. Project partners include members of the Lower Yellowstone Irrigation Project.

- 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: 6/2023
  Proposed Construction End Date: 6/2025
  Project Duration: 24 Months

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

  The Lower Yellowstone Irrigation Project (LYIP) is part of the Bureau of Reclamation Lower Yellowstone Irrigation Project (LYIP) and is located on a Federal Facility.

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 Lateral K Headgate structure is located in the NW/4 of Section 19, Township 24 North, Range 60 East, P.M.M. in Richland County, Montana. The existing structure is located at a latitude 47.82764° North and a longitude of 104.076997° West. A map is provided as Exhibit 1.

The Lateral PP Headgate structure is located in the SW/4 of Section 10, Township 21 North, Range 59 East, P.M.M. in Richland County, Montana. The existing structure is located at a latitude of 47.58681833° North and a longitude of 104.26143167° West. A map is provided as Exhibit 1.

TECHNICAL PROJECT DESCRIPTION

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

The purpose of the Critical Structures Replacement project is to perform upgrades to several structures within the Lower Yellowstone Irrigation Project's (LYIP's) delivery system, that include the Lateral K headgate and Lateral PP headgate. These structures were constructed in the early 1900s as part of the Reclamation Act of 1902 and have well exceeded their useful design life. All these structures are old deteriorated concrete structures that leak water significantly and contribute to a significant overall loss of water within the LYIP system that creates management difficulties particularly during times of lower flows in the Yellowstone River and peak

water use. The structures are all in remote areas that are difficult to access and require manual operation. The purpose of the project is to replace these existing structures with modernized structure designs and components that will include new concrete, new gates, and state-of-the-art remote monitoring water measurement components that will improve irrigation efficiency, conserve water, preserve water quality, and improve management of the irrigation system.

There is significant water loss occurring in the LYIP delivery system largely due to the fact that the LYIP cannot efficiently control the water levels at the existing structures. Based on detailed LYIP records and conversations with experienced LYIP ditch riders, the identified Lateral K headgate and Lateral PP headgate both have a leakage rate of 4.0 cfs. Flow loss measurements provided by LYIP staff are provided in Appendix A. The LYIP measured losses at all their large structures throughout their delivery system. The structures that are part of this project are highlighted in yellow. The total leakage rate from these three structures is 8.0 cfs. The total leakage amounts to approximately 2,600 acre-feet of water wasted annually based on a 165-day irrigation season. Based on the WWC field visit and conversations with LYIP personnel, approximately 40% of the leakage flow returns to the Missouri and Yellowstone Rivers each year and 60% is lost to typical canal losses such as seepage and evapotranspiration. Therefore, the rehabilitation of the existing structures will conserve approximately 1,560 acre-feet of water annually. Notably, these water losses are minimized during periods of peak demand but represent an average over the water season.

The LYIP cannot currently efficiently manage flows within the water delivery system due to deteriorating structures, remote locations, manual operation requirements, and limited LYIP personnel. Currently, adjustments to the irrigation structures can only be made manually. This routinely requires daily trips, about 40 miles round-trip and up to 10 hours per week (as reported by the LYIP) during the busy irrigation season, to check the water flow in the system at each location and make necessary flow adjustments throughout the canal system. This daily travel is inefficient, and oftentimes LYIP personnel are forced to divert excess water into the canal system to try to meet the water demand for all users. These structures have many issues including the inability to effectively control water levels, inability to measure flows going into laterals, extensive leaking of water, expensive and dangerous operation and maintenance, structural deterioration, safety concerns due to the lack of safety equipment and/or railing, inefficient delivery, and erosion along the canal.

The project involves replacing the double headgate lateral structures for Lateral K and Lateral PP and installing a new double headgate structure using the LYIP Preferred Design method which includes replacing both the headwall and end wall with a simplified concrete structure (no vanes, special angles, or changes in elevation), and standard Waterman-style headgates. The LYIP and many other irrigation projects throughout Montana have had great success with this modified approach to the replacement of older BOR structures. The older BOR design is dated and was an excellent design for its time, but the components of the design are extremely difficult to rebuild and/or replace (i.e., the gates have to be custom

fabricated) making the structure difficult to build and very expensive. Each new headgate structure will be built with a downstream Cipolletti weir with a stilling well that will be equipped with Supervisory Control and Data Acquisition (SCADA) components that will allow the LYIP to connect these monitoring stations to transmit data back to the LYIP main office for remote monitoring of flows out of each structure. The inclusion of SCADA equipment will allow the LYIP to have real-time flow data to be able to better manage flows throughout the LYIP system. Reference Exhibits 1 and 2 for examples of the Cipolletti weir and double headgate structure.

Problems and Needs

The Lateral K and Lateral PP headgates are old deteriorated concrete structures that leak water significantly, contributing to a significant overall loss within the LYIP system that creates management difficulties particularly during times of lower river flows and peak water use. Management difficulties lead to a combination of water shortages to crops or too much water in the irrigation system and excessive water wasted back to the Yellowstone River. The return flows to the river degrades the water quality due to the sediment loading, high nutrient content, and chemicals received from runoff of the adjacent farm fields. The existing structures are all in remote areas that are difficult to access. The structures currently require manual operation and are in poor operating condition, making them dangerous to operate and inefficient in irrigation management.

As time has gone on, the LYIP has done its best to keep up on the aging and deteriorating infrastructure. The Lower Yellowstone Irrigation Project has completed many projects to help maintain the reliability, efficiency, and delivery of the canal. However, due to the age of the irrigation infrastructure and the complexity of the original Bureau of Reclamation (BOR) design, many of the structures within the LYIP are in a highly deteriorated condition. Although the design of the project in the early 1900s was an engineering marvel at its time, the BOR design is overly complex for the project based on current construction materials. For example, many of the lateral headgate structures utilize a rectangular 2'x3' gate or a 3'x4' gate and outlet conduit (that contains angles and drops) that are outdated and not an industry standard. Thus, to replace this gate or conduit, specialized gates must be manufactured, or the outlet conduit formed and poured in place with new concrete at a very high cost. A substantially cheaper and easier maintenance alternative to these specialized installations is to replace the structure with new, round Waterman-type headgates with precast concrete pipe. In addition, the inlet and outlet headwalls are complex with a number of vanes and angles that are difficult to pour and require specialty construction forms and experience to replace. The cost of replacing these structures in kind is extremely expensive and not within the LYIP's annual operating budget. Although the LYIP has begun the process of replacing these structures, recent failures of portions of the main canal and large structures have depleted the LYIP's reserves, making it very difficult to find additional money to keep up with the deterioration. Replacing these complicated structures with a simpler, proven system will provide the LYIP with a more modern system that will provide a stable source of water to

their users for the next 50+ years along with alleviating many operational and maintenance issues.

The LYIP cannot currently efficiently manage flows within the water delivery system due to deteriorating structures, remote locations, manual operation requirements, and limited LYIP personnel. Currently, adjustments to the irrigation structures can only be made manually. This routinely requires daily trips, about 40 miles round-trip and up to 10 hours per week (as reported by the LYIP) during the busy irrigation season, to check the water flow in the system at each location and make necessary flow adjustments throughout the canal system. This daily travel is inefficient, and oftentimes LYIP personnel are forced to divert excess water into the canal system to try to meet the water demand for all users. These structures have many issues including the inability to effectively control water levels, inability to measure flows going into laterals, extensive leaking of water, expensive and dangerous operation and maintenance, structural deterioration, safety concerns due to the lack of safety equipment and/or railing, inefficient delivery, and erosion along the canal. These issues are present at each of the identified structures. The replacement of these deteriorated structures would allow the LYIP to effectively control flows throughout the canal system and maximize water delivery efficiency by eliminating the practice of diverting extra water to overcome these inefficiencies.

Specific Activities that will be Accomplished

Design/Permitting/Construction Oversight: *LYIP will contract with a licensed Professional Engineer to complete the design of the Critical Structures Rehabilitation Project. The Engineer will be responsible for the design of the proposed project, which will include, but is not limited to hydraulics, structure details including planimetric layout and reinforcement detailing, Cipolletti weir design, erosion control plan, remote monitoring and control system components, automation and controls, alignment/grade, details, etc. The Engineer will work with regulatory agencies to complete environmental compliance. The Engineer will provide a final plan set and specifications for the proposed project to facilitate construction. The Engineer will also provide advisory services during construction of the project to assure proper installation in accordance with the design plans and specifications.*

Construction: *The proposed project will be completed using LYIP personnel and equipment as well as assistance from a remote monitoring and control installer. The LYIP owns the construction equipment that is necessary to construct the new concrete structures and the LYIP personnel are trained and experienced at using this equipment. The LYIP has their own construction crews to be able to maintain their existing infrastructure and keep costs low, providing a benefit to their users. The LYIP has an experienced earthwork and concrete construction crew that will perform the work. The LYIP has experienced equipment operators and laborers that perform all the LYIP's construction tasks. Recent improvements completed by the LYIP include relocation of approximately ½-mile of the main canal, construction of the new Lateral O, Lateral W and Terminal Wasteway structures, various check structure and wasteway rehabilitation projects, concrete pump station construction, canal lining projects, road construction and other various construction and maintenance projects.*

All material and supply costs are accounted for in the unit prices provided in Table 2. The material costs were determined as follows:

- *Mobilization/Demobilization, Old Structure Removal, Compacted Fill, Excavation: Determined from using equipment and labor rates provided by LYIP.*
- *Bentonite Bag – 80 lbs: Determined from using material cost from local supplier and using equipment and labor rates provided by LYIP.*
- *H-Pile Installation: Determined from estimate provided by quote from True North Steel in Billings.*
- *Geotextile: Determined from estimate from paramount materials.*
- *Aggregate Base Course: Determined from estimate from LYIP.*
- *Structural Fill: Determined from estimate from LYIP.*
- *Structural Concrete: Determined from estimate from Sidney RED-E-Mix.*
- *48" RCP: Determined from price listed on Northern pipe's website.*
- *Stilling Well: Determined from quote from True North Steel in Billings.*
- *Steel for Cipolletti Weir: Determined from quote from True North Steel in Billings.*
- *Waterman 48" Headgate: Determined from quote from True North Steel in Billings.*
- *Remote monitoring and control components: Determined from estimate provided by Stealth Industries, Inc.*
- *Riprap: Determined from estimate from LYIP.*
- *Seeding: Determined from estimate from LYIP.*
- *Erosion Control: Determined from estimate from LYIP.*

The LYIP will utilize the following equipment to perform the work:

- *2009 Chevrolet 1 Ton Welding Truck and 2001 Trail-Eze 3-axle Trailer to haul materials to and from the work site.*
- *2013 Kenworth T-800 Tractor with Lowboy Trailer*
- *2017 Ford F-250 Pickup and 2018 GMC 2500HD Pickup: To transport equipment operators and laborers to and from the project work site. Will also be used for general site activities, materials, and trips to obtain parts and materials.*
- *2018 Kenworth T-800 Dump Truck (10 cubic yard capacity): Will provide haul of materials to and from the project site and various materials hauling activities required for the construction.*

- *2016 Cat 323FL Excavator: Will provide the primary means to load/unload parts and materials at the project site and perform all earthwork moving activities.*
- *CAT D6 Dozer: Will be used to provide final site grading at each location prior to seeding.*

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 result in water conservation, drought resiliency, enhanced staff safety, improved water supply and management, water users conflict resolution, and increased irrigation efficiency that will improve future on-farm improvements. The critical structures rehabilitation is expected to increase available water to the LYIP irrigators by nearly 1,560 acre-feet during an average water year. This water is normally lost as the LYIP cannot efficiently control the water levels at the existing structures. This results in an unnecessary amount of water within the canal at any given time that is spilled or wasted at other locations throughout the LYIP system along with the deteriorated condition of the existing structures which results in seepage losses as water flows through the structures.

Additional project benefits will include improved crop production. Using their Annual Crop Census Report, the LYIP has estimated that a water savings of 1,560 ac-ft per year would translate to an approximate 2.9% increase in crop yield for 8,362 acres served by the Lateral PP headgate (3,202 acres), and Lateral K headgate (5,160 acres). If realized, the projected yield improvements could produce a regional agricultural revenue increase of $160,473 per year.

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 proposed critical structure rehabilitation project will provide a significant water savings of an average of 8.0 cfs, or 1,560 acre-feet per year. Based on detailed LYIP records and conversations with experienced LYIP ditch riders, the identified Lateral K headgate and Lateral PP headgate both have a leakage rate of 4.0 cfs. The total leakage amounts to approximately 2,600 acre-feet of water wasted annually based on a 165-day irrigation season. Based on the WWC field visit and conversations with LYIP personnel, approximately 40% of the leakage flow returns to the Missouri and Yellowstone Rivers each year and 60% is lost to typical canal losses such as seepage and evapotranspiration. Therefore, the rehabilitation of the existing structures will

conserve approximately 1,560 acre-feet of water annually. Notably, these water losses are minimized during periods of peak demand but represent an average over the water season.

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)?

   The proposed Critical Structures Rehabilitation project will result in minimal spills from the wasteway at the end of laterals served by the Lateral PP headgate and Lateral K headgate that spills water into a drain that carries water back to the Yellowstone River. The drain is an ephemeral channel that cannot accept a significant amount of water without excessive erosion and seepage. Based on the WWC field visit and conversations with LYIP personnel, approximately 40% of the leakage flow returns to the Missouri and Yellowstone Rivers each year and 60% is lost to typical canal losses such as seepage and evapotranspiration. The returned water also has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients in the Yellowstone River that is already identified by the EPA as an impaired stream and is under a TMDL.

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?

   Based on estimates provided by the LYIP, approximately 60% of the water wasted does not make it back to the Missouri and Yellowstone Rivers and is lost through evaporation and seepage. The remaining 40% is loaded with sediment and nutrients that is returned to the Missouri and Yellowstone Rivers. The returned water also has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients in the Yellowstone River that is already identified by the EPA as an impaired stream and is under a TMDL.

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

   No. The returned water has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures in the Yellowstone River that is already identified by the EPA as an impaired stream and is under a TMDL. The returned water also carries significant amounts of sediment and nutrients that contribute to the TMDL in the Yellowstone River. The returned water has a negative benefit to the Yellowstone River.

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 estimated quantity of additional supply the project will provide is 1,560 acre-feet of water per year as an average annual benefit over the next 30 years. The water loss at each structure was measured by LYIP staff. The cross-sectional area, water depth, and estimated velocities were taken upstream and downstream for each structure. The measurements were used to calculate the canal flow upstream and downstream of each structure with the difference being the water loss through each structure. These calculations show that the Lateral K headgate and Lateral PP headgate both have a leakage rate of 4.0 cfs. The total leakage rate from these three structures is 8.0 cfs. Appendix A of this application includes the calculated losses from the LYIP staff.

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 estimated quantity of additional supply the project will provide is 1,560 acre-feet of water per year as an average annual benefit over the next 30 years. Based on detailed LYIP records and conversations with experienced LYIP

ditch riders, the identified Lateral K headgate and Lateral PP headgate both have a leakage rate of 4.0 cfs. The total leakage rate from these two structures is 8.0 cfs. The total leakage amounts to approximately 2,600 acre-feet of water wasted annually based on a 165-day irrigation season. Based on the WWC field visit and conversations with LYIP personnel, approximately 40% of the leakage flow returns to the Missouri and Yellowstone Rivers each year and 60% is lost to typical canal losses such as seepage and evapotranspiration. Therefore, the rehabilitation of the existing structures will conserve approximately 1,560 acre-feet of water annually. Flow loss calculations for each structure are provided in Appendix 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?

At the Lateral PP and Lateral K headgates, there are currently no existing measurement devices. The measurements taken to calculate the flow losses were based on the channel geometry and velocities. The accuracy of these measurements is approximately ±10% in a controlled, laboratory environment performed by the Bureau of Reclamation. It is assumed that the field measurements using this methodology would be higher.

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

The proposed project would install Cipolletti weirs downstream of each structure. This would provide the LYIP will more timely and accurate flow measurements at each location. The accuracy of the proposed Cipolletti weirs is likely within ±5%. The accuracy of Cipolletti weirs is well documented in literature such as the USBR Water Measurement Manual.

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

Yes, the annual farm delivery volumes will be reduced as the current practice is to convey more water into the system and divert more water than is necessary into the turnouts. The proposed structure replacements will eliminate the water losses through each structure along with providing accurate and real-time flow measurements downstream of each structure. The reduction of the 8.0 cfs lost at each of the irrigation structures will be eliminated. Additionally, the real-time flow data will be reported back to LYIP's main office to assess the actual flows versus the actual demand. This will allow the LYIP to react quicker to changes in demands and have LYIP operators make more timely adjustments to the gates at the proposed

structures. This is a very conservative estimate as the amount of water diverted into the turnouts is generally more than is needed to spread the excess water out so that it does not overwhelm the wasteway and drain system at the end of the system.

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

The proposed project will install Cipolletti weirs, stilling wells, and remote flow monitoring equipment downstream of the Lateral K headgate and Lateral PP headgate structures. The flow data for each weir will be transmitted back to the LYIP main office in Sidney where the flows will be recorded on their computer. At the end of each irrigation season, the LYIP will be able to observe the total flow rate that was conveyed through each structure. The calculated flows losses at the structure based on the current condition of each structure could then be applied to the total flow rate to be able to calculate the actual water savings each year.

(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 LYIP 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 LYIP system has a significantly higher temperature than water in the river, creating an unnecessary contribution to higher temperatures and nutrients in the Yellowstone River that is already identified by the EPA as an impaired stream and is under a TMDL. The returned water has a negative benefit to the Yellowstone River. The proposed Critical Structures Replacement project will enable the LYIP to monitor flows through the structures in real-time with the installation of the Cipolletti weirs and remote flow monitoring equipment to allow the LYIP to react more quickly to changing flow and water demands, thus minimizing spills that will significantly reduce the higher temperature sediment and nutrient heavy return flows to the Yellowstone River.

- 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.

  The proposed project will have a beneficial impact on the local economy by furnishing short-term work during construction of the project and long-term allotments for sustainable agricultural production. Sustaining agricultural production and increasing ag-driven revenue generation are crucial to maintaining rural communities in Montana. All the LYIP users rely heavily on ag-based commerce. The proposed project will protect the source of water supply to the LYIP system to preserve the agricultural crops and revenue. The protection of this revenue generated by the project will tie back into the local economy by way of commercial trucking, local implement dealers, and local businesses. The project will also prevent significant revenue losses to LYIP

Lateral K and Lateral PP users in typical annual revenue by providing a consistent flow of water for irrigation. Consistent flows from the proposed project will facilitate improved crop production, increase revenues to producers, and stimulate the local and regional economies. The LYIP users primarily grow alfalfa hay, grass hay, wheat, barley, corn, sugar beets and soybeans. Discussions with local growers within the area indicate that the locally grown crops will be distributed throughout the State of Montana. Increases in crop production will have a direct impact on a statewide basis, as the crops produced are used throughout the State and contribute to the local and state tax bases from increased revenues.

The proposed rehabilitation project will provide significant financial, safety, and operational improvements to the LYIP Lateral K and Lateral PP users. Rehabilitation of the critical structures will ensure that the agricultural revenues from irrigated crops and pasture lands will continue to support over $5 million in annual revenues that result directly from alfalfa, wheat, corn, soybeans, barley, beets, and grass hay production on 8,362 acres within the LYIP system. The proposed structure replacement project will provide a safer work environment with new, state-of-the-art components for measuring flows downstream of each structure that will alleviate many of the existing operational issues and reduce the chance that employees will be placed in harm's way. The proposed rehabilitation project will significantly reduce the amount of time that the LYIP spends on operation and maintenance, allowing them to focus on other improvements and operations within the LYIP system that need their attention. Additional local benefits include boosting the local economy through workers, material suppliers, truckers, and other temporary workers contributing to local stores, restaurants, and gas stations during construction of the proposed project.

- 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 not provide a direct energy efficiency improvement. However, the more efficient use of the water and the real-time flow measuring within the LYIP will reduce the amount of waste from the system that will also reduce the amount of sediment and nutrients that are transported back to the Yellowstone River via wasteways and drains.

  The proposed project reduces greenhouse gas emissions in two ways. First the additional water that is saved can be utilized by downstream water users within the LYIP system to increase crop production which will create more vegetation to sequester carbon. Second, the LYIP will not have to make as many trips to the structures to adjust flows, saving vehicle miles that will burn less overall fuel and lower carbon dioxide emissions from LYIP 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.

  Implementation of the proposed improvements will significantly benefit the LYIP's management of the irrigation water delivery network. The existing structures are experiencing deterioration, operational difficulties, unsafe conditions and are in remote locations. By replacing the existing structures, the LYIP's management issues would be greatly reduced. It is anticipated that LYIP personnel would still be required to make trips to each structure for general operation and maintenance; however, the LYIP conservatively estimates that the number of trips would be reduced by over 50% based on experience with prior structure replacement projects. LYIP personnel typical make 2 trips per day to the structures to make gate adjustments and to make the necessary repairs to keep the structures operational. After the structures are replaced only 1 trip per day would be necessary to make gate adjustments. From LYIP's main office in Sidney to the project structures is about 40 miles

round-trip. The new structures would reduce vehicle mileage by up to 40 miles per day and 7 hours per week of labor. At an average operation of 109 days during the irrigation season, that equates to over 4,360 miles traveled that will not be necessary and in turn reducing greenhouse gas emissions.

- 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).

  With the implementation of remote monitoring measurement equipment for each structure, the LYIP will have the opportunity to develop solar energy within the irrigation distribution system. Rehabilitating the structures with new remote monitoring measurement stations will include the installation of solar panels that will power all the necessary telemetric equipment at each location. The remote locations of each site would require a significant cost and effort on LYIP's part to deliver traditional power to each site. Remote control capabilities powered completely by solar power at each structure would greatly benefit the LYIP. It is anticipated that the telemetry equipment would provide energy savings for the LYIP as well as provide a fully sustainable power source for all necessary equipment at the structures.

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 replacement of the structures for the Lateral PP and Lateral K headgates improvements will provide a significant water savings of an average of 8.0 cfs, or 1,560 acre-feet per year. All of the structures divert water directly from the LYIP main canal. By saving this water, the LYIP will have an additional 1,560 acre-feet that will be available for crops during peak irrigation demand and periods of drought. The proposed structure improvements will also provide the LYIP the ability to measure flows conveyed through the structures real-time with the installation of the Cipolletti weirs. The pressure transducers installed in the new stilling wells that will measure the flows at the weirs will be monitored through remote monitoring and control components that will tie into the LYIP's existing remote monitoring and control system. The LYIP has been using this monitoring technology for the past 10

years with great success. This technology is not new and has been proven to be effective for control and operation of irrigation infrastructure such as pumps, gates and measuring stations. The proposed improvements will allow the LYIP to monitor flows very precisely into the LYIP system. This project will provide a means for the LYIP to monitor water use and flow in these laterals to provide more efficient use of water. The LYIP closely monitors snowpack, Yellowstone River flows and flows into their diversion. These tools allow the LYIP to predict 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 LYIP system, they will be able to be proactive at managing the water within their system rather than being reactive, which will allow the LYIP to have more water for downstream users when water rationing is being implemented to reduce the overall impact of drought conditions when they occur and the water rationing that is necessary.

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

  The proposed project includes both green and sustainable infrastructure to improve community climate resilience. This project will save precious water that can be used to mitigate the magnitude of downstream water rationing. In addition, the more efficient use of the water within the LYIP delivery system will reduce the amount of waste from the system that will also reduce the amount of sediment and nutrients that are transported back to the Yellowstone River via wasteways and drains.

  One of the prominent features of climate change that we have noticed and that has been scientifically proven is that as climate change continues to occur, winter months are shortened, and runoff tends to occur earlier than it did in the previous decade (documented in the 2017 Montana Climate Assessment https://montanaclimate.org/chapter/water). When this happens, river flows fall off earlier than previously and water rationing within irrigation districts becomes more prevalent as river flows drop off going into the hotter summer months of July, August, and September. The LYIP has focused on irrigation efficiency as their primary defense against drought and climate change. As the LYIP system becomes more efficient, more water is available to the LYIP users to reduce the impacts of water rationing due to drought. Although water rationing will not be completely avoided, the more water that is saved will result in less water rationing that has to occur and keep more water in the Yellowstone River outside of periods of peak irrigation demand.

- 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 proposed project will involve water conservation and a management improvement component that will promote healthy lands and soils that will also protect the LYIP's water supply. The proposed structure replacement improvements will allow the LYIP to measure the real-time flows through each structure and provide quicker changes to the flows to match the demand to

provide the exact amount of water that is needed within each lateral system, promoting healthy agricultural crop production, and minimizing the amount of waste flows from the system which will minimize the amount of erosion that occurs from discharges into drains and wasteways. The proposed project provides a unique opportunity to save water seepage losses through each structure along with the ability to monitor flows in real-time. The LYIP is required to supply more water to the existing structures because they do not have the ability to supply the exact amount of water that is needed along with having to account for the seepage losses. Thus, during certain periods of the year that are outside of the peak irrigation demand, more water is diverted from the Yellowstone River than is necessary to fulfill the demand. When this happens, much of this water is spilled from the system and is lost to evaporation and seepage. The remaining water is discharged back to the Yellowstone River in the form of higher temperature water that contains significant amounts of nutrients and sediment. The proposed project will minimize discharges back to the river by being able to adjust flows through the Lateral PP and K headgates more quickly into these laterals to meet the demand.

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

  The proposed project will provide water conservation benefits that can be left in the Yellowstone River outside of peak irrigation demand periods. The additional water will benefit the Yellowstone River ecology by leaving cleaner water in the river system to support fish and wildlife habitat. The Pallid Sturgeon is an endangered species that has been in the media spotlight for some time in this portion of the Yellowstone River. The new diversion bypass that is currently being constructed will allow the Pallid Sturgeon to migrate further upstream to promote the natural spawning of this species. Additional river flows during the spring and fall months can facilitate more water through the bypass system that will promote Pallid Sturgeon spawning and recovery.

  Reclamation has been heavily involved in the restoration of Pallid Sturgeon through the recent Lower Yellowstone Intake Diversion Dam project that is implementing a river bypass to assist in Pallid Sturgeon recovery by allowing a path for the fish to migrate upstream of the intake diversion dam. The amount of streamflow added could be as high as 8.0 cfs during periods outside of peak irrigation demand. The exact number of natural fish left within the lower Yellowstone River and the Missouri River below Fort Peck Dam and above Lake Sakakawea are not known, but the numbers are dwindling. Water conservation efforts by the LYIP will leave more water in the river outside of peak irrigation

demand periods to facilitate the use of the new bypass structure for Pallid Sturgeon.

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

  The proposed Critical Structures Replacement project will result in minimal spills from the wasteway at the end of Lateral K and Lateral PP that spills water into a drain that carries water back to the Yellowstone River. Currently, the LYIP spills significant amounts of water from this wasteway and the end of the sub-laterals which results in soil erosion to the drainage channels that carry this water toward the Yellowstone River. By providing water efficiency through the elimination of seepage through the existing structures along with the installation of remote flow monitoring infrastructure at each location, the LYIP can more time make adjustments to the headgates to minimize spills. The minimal spills will provide an optimal condition for the drainage channels that carry this excess water toward the Yellowstone River, as the minimal spills will not be erosive, will allow the channels to establish vegetation, and will 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?

  In recent years, drought conditions and climate change have had a significant impact on the users within the LYIP system. Water rationing has become an annual occurrence within the LYIP, as water demands continue to increase due to increased heat index and warmer weather conditions while the water availability continues to decrease due to climate change which continues to result in earlier runoff and longer periods of low-flow conditions in the river. The LYIP has turned its focus to making its system more efficient to be able to reduce the impact of water rationing and make more water available to downstream users by not wasting or losing water in the system.

  The proposed replacement of the Lateral K and Lateral PP headgate structures would conserve water through the elimination of seepage losses of irrigation water flowing through these structures along with the ability to respond more quickly to changes in flow demands downstream of the structure though the implementation of the remote monitoring system at each structure. The LYIP has historically had to divert extra water from the LYIP Main Canal as the water loss due to seepage at each structure had to be accounted for. Additionally, the flows through each structure had to measured manually as they were only performed concurrently with the adjustments of the gates. The LYIP operators would release additional flows through the structures to make sure the users had adequate water, even though it resulted in the wasting of additional water at the end of the system due to the inability to remotely monitor flows and the limited resources available to perform adjustments to the flows through each structure. The proposed structure replacements along with the installation of Cipolletti weirs with transducers connected to the LYIP's remote

measuring system will provide the LYIP with real-time flow data to allow for improved management of the flows through each structure along with reducing the large seepage losses occurring through the existing structures which will result in the improvement efficiency of the water delivery in the system by not having to divert additional water to account for the seepage losses. The proposed improvements will provide LYIP with the tools to properly manage the water resource and be able to make decisions on where the 1,560 acre-feet of conserved water will go (left in the river or put to beneficial use).

The proposed structures replacement project will significantly benefit the LYIP's management of the irrigation water delivery network through decreased operation and maintenance tasks, remote monitoring, and real-time data acquisition. The structures are operated manually using either old, dilapidated control structures and/or wooden check boards that are unsafe, ineffective, and require personnel to enter the canal. The difficult manual operation due to the degradation of each of these structures requires experienced LYIP ditch riders to spend approximately 4 additional hours per week on the operation of each structure. The time that ditch riders would save through the implementation of the project would allow the LYIP to put these resources to use on other areas of LYIP's delivery system to improve the water delivery efficiency of the entire system.

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 LYIP currently monitors flows within the LYIP systems as well as water in the Yellowstone River on a constant basis. These records will continue to be kept following the proposed Critical Structures Replacement project to track the improvements in water efficiency and improved streamflow that will occur outside periods of peak irrigation demand when the LYIP needs 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.

  One of the prominent features of climate change that we have noticed and that has been scientifically proven is that as climate change continues to occur, winter months are shortened, and runoff tends to occur earlier than it did in the previous decade (documented in the 2017 Montana Climate Assessment https://montanaclimate.org/chapter/water). When this happens, river flows fall off earlier than previously and water rationing within

irrigation districts becomes more prevalent as river flows drop off going into the hotter summer months of July, August, and September.

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

- *Montana's snowpack has declined over the observational record, since the 1930s.*
- *Continued warming temperatures will reduce snowpack at mid and low elevations.*
- *Historical observations show a shift toward earlier snowmelt and an earlier peak in spring runoff.*
- *Earlier onset of snowmelt and spring runoff will reduce late-summer water availability.*
- *Multi-year and decadal-scale droughts have been and will continue to be a natural feature of Montana's climate.*
- *Changes in snowpack and runoff timing will likely increase the frequency and duration of drought during late summer and early fall.*

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

The proposed project includes both green and sustainable infrastructure to improve community climate resilience. This project will save precious water that can be used to mitigate the magnitude of downstream water rationing during periods of peak demand in the late summer when water levels in the river are lower. The LYIP delivery system will need to be as efficient as possible to combat the ongoing water rationing issues to reduce the interruption of water delivery to the producers served by the system.

- 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 LYIP has focused on irrigation efficiency as their primary defense against drought and climate change. As the LYIP system becomes more efficient, more water is available to the LYIP users to reduce the impacts of water rationing due to drought. Although water rationing will not be completely avoided, the more water that is saved will result in less water rationing that has to occur. This proposed project will save water consistently that will leave more water available to downstream LYIP users to protect against water rationing due to drought and/or climate change. The proposed Remote Monitoring Improvements will utilize solar panels with a battery bank as the primary energy source, thus eliminating the reliance on the energy grid.

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

  The proposed project will provide water conservation benefits that can be left in the Yellowstone River outside of peak irrigation demand periods. During periods of peak irrigation demand, the LYIP currently experience water shortages due to a lack of available water, especially during periods in the late summer months. The water saved during these periods will be left in the LYIP Main Canal to be used by downstream users on the LYIP system 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 real-time water measurements through the installation of Cipolletti weirs with stilling wells and pressure transducers will allow the LYIP to direct ditch riders to these locations sooner to respond to changes in flow demands. Replacing the aging structures will also conserve a significant volume of water each year. The real-time water measurement is the key mechanism that the LYIP will utilize to either leave the conserved water in the river or utilize the conserved water to alleviate water demands further downstream in the LYIP system.

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

  The estimated quantity of additional supply the project will provide is 1,560 acre-feet of water per year as an average annual benefit over the next 30 years. Based on detailed LYIP records and conversations with experienced LYIP ditch riders, the identified Lateral K headgate and Lateral PP headgate both have a leakage rate of 4.0 cfs. The total leakage rate from these two structures is 8.0 cfs. The total leakage amounts to approximately 2,600 acre-feet of water wasted annually based on a 165-day irrigation season. Based on the WWC field visit and conversations with LYIP personnel, approximately 40% of the leakage flow returns to the Missouri and Yellowstone Rivers each year and 60% is lost to typical canal losses such as seepage and evapotranspiration. Therefore, the rehabilitation of the existing structures will conserve approximately 1,560 acre-feet of water annually. Notably, these water losses are minimized during periods of peak demand but represent an average over the water season.

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 structure replacement improvements will provide the LYIP the ability to measure flows through the structures real-time along with conserving water that is currently lost through seepage through the degrading structures. The pressure transducers installed in the stilling wells at each Cipolletti weir will be connected and monitored through remote monitoring components that will tie into the LYIP's existing remote monitoring system. The LYIP have been using this technology for the past 10 years with great success. This technology is not new and has been proven to be effective for control and operation of irrigation infrastructure such as pumps, gates and measuring stations. The proposed improvements will allow the LYIP to monitor flows very precisely into the LYIP system. This project will serve as a test case to monitor water use and flow to provide more efficient use of water. The LYIP closely monitor snowpack, Yellowstone River flows and flows into their diversion. These tools allow the LYIP to predict the amount of water that will be available and provide drought monitoring tools that can predict current drought conditions to account for climate change. By providing more flow measurement locations within the LYIP system, they will be able to be proactive at managing the water within their system rather than being reactive, which will allow the LYIP to have more water for downstream users when water rationing is being implemented to reduce the overall impact of climate change such as drought conditions when they occur and the water rationing that is necessary.

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

  Yes, the proposed improvements will reduce the water diverted from the Yellowstone River during non-peak irrigation demand. This improves the sustainability of the water supply. One of the prominent features of climate change that we have noticed and that has been scientifically proven is that as climate change continues to occur, winter months are shortened, and runoff tends to occur earlier than it did in the previous decade (documented in the 2017 Montana Climate Assessment https://montanaclimate.org/chapter/water). When this happens, river flows fall off earlier than previously and water rationing within irrigation districts becomes more prevalent as river flows drop off going into the hotter summer months of July, August, and September. The LYIP has focused on irrigation efficiency as their primary defense against drought and climate change. As the LYIP systems becomes more efficient, more

water is available to the LYIP users to reduce the impacts of water rationing due to drought. Although water rationing will not be completely avoided, the more water that is saved will result in less water rationing that has to occur.

- 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 reduces greenhouse gas emissions in two ways. First the additional water that is saved can be utilized by downstream water users within the LYIP system to increase crop production which will create more vegetation to sequester carbon. Second, the LYIP ditch riders will not have to make as many trips to the structures to adjust flows and check on the flows through the structures and the condition of the structures themselves as the current condition requires many in season repairs to be made, saving vehicle miles that will burn less overall fuel and lower carbon dioxide emissions from LYIP 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*

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

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

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

The proposed project will provide water conservation that can be used to assist in complying with the Yellowstone River Compact.

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

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

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

The proposed project is part of a series of planned projects by the LYIP to modernize their irrigation system and make it more efficient to address the sustainability of the water supply. The more water that can be saved within the system will allow the LYIP to reduce and minimize the overall impact of drought conditions.

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

The following is a quote from LYIP Manager James Brower: "The drought caused the LYIP to start water rationing (enforced reduced water delivery) early and multiple times during the season. The LYIP office and employees received hundreds of phone calls and complaints from multiple farmers believing their neighbors or other towns were receiving more water than they were. LYIP employees were called out to settle water disputes over 100 times in 2021 at any time of the week and at any hour of the day. The

LYIP spent hundreds of hours of overtime monitoring water deliveries and settling water disputes." The proposed project will allow the LYIP save water that can be used to mitigate downstream shortages in water demand within the LYIP system.

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.

      Lateral PP headgate and the Lateral K headgate structures provide water to approximately 8,362 acres for irrigation. Lateral PP has 22 unique users and Lateral K has 27 unique users. Many of the farmers/ranchers within the project have applied for and have received EQIP funding for pivots and other on-farm conservation improvements. The LYIP currently has no farmers who are working with the local NRCS to put in on-farm improvements. However, several farmers have taken advantage of the NRCS EQIP program in the past to install center pivots on lands served by the LYIP

and many of the farmers within the LYIP are open to potential support through NRCS programs.

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

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

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

  After speaking with Jamie Selting (October 20, 2021), the local NRCS District Conservationist in Sidney, past projects involving the construction of pressurized pipelines and center pivots have been completed through assistance from the NRCS to implement these on-farm conservation and efficiency projects through the EQIP program. The local NRCS has provided additional services within the LYIP that includes inventory of irrigation structures, seepage analysis and mitigation, engaging the Montana Salinity Control to install wells to identify losses and other studies. Thus, Mr. Selting was excited about the proposed project as the project meets the local NRCS goals for water conservation and expects that several of the existing landowners within the LYIP will approach the local NRCS once the project is completed. It is anticipated that additional pipelines for the main turnout ditches, other seepage mitigation measures such as canal lining and additional center pivots may be projects that would benefit the local landowners and that would be served well by the proposed Critical Structures Replacement project.

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

  None available at this time.

- Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.
  - Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installing a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation.

    The proposed project will prevent water shortages through the mitigation of 1,560 acre-feet per year of wasted flows due to seepage losses through

the degraded structures and will provide a more consistent and timely water delivery. The proposed structure replacement with the implementation of real-time measurement capabilities will provide the LYIP water users with the amount of water in a timelier manner that is necessary that will serve to support efficient on-farm practices such as center pivot irrigation. Based on discussions with Jamie Selting, NRCS District Conservationist in Sidney, the proposed structure replacements provide an optimal situation for farmers who want to put in efficient on-farm irrigation practices such as center pivots as the farmers will be able to rely on a consistent flow of water in the irrigation supply canal or turnout that would have the irrigation pump installed in.

OR

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

  The proposed Critical Structures Replacement project will maximize efficiency in this area by providing mitigation to conserve 1,560 acre-feet per year, provide an increase to water delivery efficiency, and provide timelier water delivery to facilitate on-farm efficiency.

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

    Based on information provided by the local NRCS, the proposed structure replacements and improvements project would provide more opportunities for landowners to incorporate on-farm water conservation and/or water use efficiency projects through more reliable and timelier deliveries of irrigation water to the supply canals and turnouts where on-farm improvements would be implemented.

- 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 LYIP's water service area boundaries has been provided as Figures 1 and 2.

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

contact information, www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/states/.

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

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

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

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

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

Provide the following information regarding project planning:

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

The LYIP is following the Montana State Water Plan and the Montana 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 located http://dnrc.mt.gov/divisions/water/drought-management*, and the Montana State Water Plan is located* http://dnrc.mt.gov/divisions/water/management/docs/state-water-plan/2015_mt_water_plan.pdf*. Although the Missouri Headwaters Basin Study is located upstream of the LYIP service area, the study also provides guidance to the LYIP in their planning efforts. The plan can be found at* https://www.usbr.gov/watersmart/bsp/docs/finalreport/Missouri/MissouriBasinStudyFinalReport.pdf*. Based on the objectives found in these plans, the LYIP board meet annually to discuss projects that fit within the goals and objectives of both plans. Water conservation is high on this list as outlined on Page 67 of the Montana State Water Plan that identifies water use efficiency and water conservation as one of the primary goals and key recommendations to address water supply and demand in Montana. Section 6.6.1 of the Missouri Headwaters Basin Study outlines increasing canal and on-farm irrigation efficiencies as a system-wide water management strategy. The LYIP Board has recently met and believes that the Critical Structures Replacement project is one of their highest priorities in meeting these objectives.*

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

One of the Key Recommendations from the Montana State Water Plan 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.

(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, *Section 6.6.1 of the Missouri Headwaters Basin Study outlines increasing canal and on-farm irrigation efficiencies as a system-wide water management strategy. The study also references conserving water as a mitigation and response action for increased drought resilience (page 122). As previously described, the proposed Critical Structures Replacement project will provide a new concrete structures that are watertight and will not lose water to seepage through the structure, along with the installation of flow monitoring equipment connected to LYIP's remote monitoring system that will result in conserved water and improved delivery efficiency of water that is needed for the system, thereby conserving 1,560 acre-feet per year that can be used to address water shortages in other parts of the system.*

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 Critical Structures Replacement Project will consist of the following tasks:

- *Planning – The project will require a planning level effort to coordinate activities for the project up-front following award and contracting with Reclamation.*
- *Site Survey – The existing structures and upstream/downstream irrigation canals will need to be inspected and measurements taken to gather the baseline data required for design of the new structures and measurement equipment.*
- *Design – The proposed structure replacements will need to be designed to reflect the proper alignment and grade, hydraulic profile, construction drawing, and concrete reinforcement details. A set of plans and specifications will be developed and submitted to LYIP 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 LYIP and Reclamation. Permitting will include environmental and cultural resource compliance.*
- *Construction – LYIP crews will assist with the removal of the existing concrete structures, site grading, foundation preparation, forming, reinforcement layout, concrete pours, seeding, remote monitoring and control components, monitoring components and appurtenant materials.*
- *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 irrigation structures and downstream monitoring structures. A construction completion report will be submitted to LYIP and Reclamation.*
- *Construction and Grant Close-Out – The LYIP 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 LYIP 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 LYIP will follow up on if the grant is awarded. If needed, the following permits may be obtained with assistance from the engineer during the design process:

***SPA 124 Permit** – The Montana Department of Fish, Wildlife & Parks requires a permit for any activity that physically alters or modifies the bed or banks of a perennially flowing stream for a legal public entity. Consultation will be performed, but the activities proposed herein are likely exempt from this rule as the construction will take place in existing manmade irrigation canals. A*

Montana joint application form will need to be filled out and submitted to FWP for review.

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

***318 Authorization** – The Short-Term Water Quality Standard for Turbidity requires a permit for any construction activities that will cause temporary violations of state surface water quality standards for turbidity. Since no water will be in the irrigation canals 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 new concrete structures and Cipolletti weir measurement systems. A site visit/topographic survey to inspect and take measurements of the existing structures and adjacent canal geometry will need to be completed, followed by the design of the proposed structures (including hydraulics, geometric layout of the structures, concrete reinforcement details, earthwork grading details, remote monitoring system components, and details, etc.), followed by the development of plans and specifications for the proposed structures replacement 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 – May 2024
LYIP and Reclamation Plans Review	April 2024 – June 2024
Final Plans & Specifications	July 2024
Order Materials*	July 2024
Begin Construction	November 2024
Mid-Point Construction (50%)	February 2025
End Construction (100%)	April 2025
Construction Administration	Oct 2024 – April 2025
Construction Closeout	April 2025
As-Built Verification	May 2025
Construction Completion Report	May 2025
Grant Closeout	June 2025
Project Completion	June 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 LYIP manager attends and actively participates in training seminars, courses, and conferences such as Montana Water Resources Association (MWRA), Montana Association of Dams and Canal Systems (MADCS), Upper Missouri Water Association (UMWA), the US BOR Montana Area Office's Dam Operator Trainings, and watershed symposiums throughout Montana where they collaborate and share information. One of the primary topics as of late is the implementation of remote monitoring and control systems to improve

irrigation efficiency. The LYIP 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 LYIP Board, the Richland County Conservation District and the NRCS have all shown support for this project. The LYIP Board will make financial, manpower, equipment and material purchasing decisions as well as provide overall management of the project. The Richland County CD and NRCS have been consulted on the project and will continue to be consulted throughout the project.

- What is the significance of the collaboration/support?

  The Richland 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 NRCS is watching this project closely to determine the actual benefits of the proposed structure replacement with the installation of new remote flow monitoring infrastructure. The NRCS is a national organization that provides training and knowledge sharing throughout the US, and this information would be shared with the national program and neighboring states that could benefit a broad audience of water users.

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

  The implementation of this project and the sharing of its benefits through the Montana Association of Dams and Canal Systems (MADCS), Montana Water Resources Association, the Montana Association of Conservation Districts, Upper Missouri Water Association, and the NRCS provides a large audience to share this information with in order for them to learn from the project and evaluate remote flow monitoring projects and the replacement of more modern concrete structures in place of existing Reclamation designs for a number of irrigation districts and water users associations throughout the western US.

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

  Letters of support are attached as Appendix B.

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

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

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

The LYIP *has submitted a Renewable Resource Grant and Loan (RRGL) application to the Montana DNRC for $125,000. The total non-federal match would be $125,000 of the total $249,999.04 project cost. This equates to a total of 50% of non-federal funding 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:

  The LYIP is a Transferred Works facility. The LYIP was authorized by the Secretary of Interior on May 10, 1904, under the Reclamation Act of June 17, 1902. Construction began on July 22, 1905, and water was available for irrigation during the season of 1909. The LYIP are part of the Pick-Sloan Missouri River Basin Program that is a general comprehensive plan for the conservation, control, and use of water resources in the entire Missouri River Basin. LYIP operates an extensive system of canals and laterals including the Main Canal, 225 miles of laterals, and 118 miles of drains. Water is diverted from the Yellowstone River into the Main Canal by the Lower Yellowstone Diversion Dam near Intake, Montana. The USBR built the Lower Yellowstone Irrigation District #1 as part of the Pick-Sloan Missouri River Basin Program in 1949. The Savage Unit was authorized by the Flood Control Act of December 22, 1944, Public Law 534. The Lateral K headgate and Lateral PP headgate were designed to supply 8,362 acres of lands with irrigation water that is diverted from the LYIP main canal system.

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

  Yes, the applicant is the Lower Yellowstone Irrigation Project (LYIP) which does receive Reclamation project water through a Reclamation Repayment Contract.

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

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

  Yes, the proposed project will benefit the Lower Yellowstone Irrigation Project.

- 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 LYIP maintains flow records through each of the existing structures (Lateral K and Lateral PP through manual measurements taken at the structure when adjustments to the gates are performed. Additionally, the LYIP took canal geometry and velocity measurements both upstream and downstream of each of the existing structures to quantify the current seepage losses.

After the project is implemented, the same canal measurements and velocities would be taken to calculate the flow upstream and downstream of the new structures to verify that the water loss has been mitigated. New Cipolletti weirs, stilling wells, and pressure transducers will be installed downstream of each of the new structures. The pressure transducers will be connected to LYIP remote monitoring system that will automatically record flows at the desired intervals throughout the entire irrigation season. The water savings will be verified by the measurements taken at the measurement weirs and subtracting out the daily flows taken at each turnout. Once the project is completed, these records will be maintained in the future to validate the proposed water conservation savings.

The remote monitoring system will log the flow data in LYIP's computer system that can be compared to historical pumping and diversion data to quantify the water conservation. The LYIP has been using this technology for the past 10 years with great success. This technology is not new and has been proven to be effective for control and operation of irrigation infrastructure such as pumps, gates and measuring stations. The proposed improvements will allow the LYIP to monitor flows very precisely in parts of the LYIP system. The LYIP closely monitors snowpack, Yellowstone River flows and flows into their diversion. These tools allow the LYIP to predict 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 LYIP system, they will be able to be proactive at managing the water within their system rather than being reactive, which will allow the LYIP to have more water for downstream users when water rationing is being implemented to reduce the overall impact of drought conditions when they occur and the water rationing that is necessary.