The Bureau of Reclamation

WaterSMART Grants:
Water and Energy Efficiency Grants

Eden Valley Irrigation and Drainage District

FY 2020

BOR-DO-20-F001

Farson Lateral Phase III Piping and Hydro Project

Applicant Contact:

Ed Burton, President
P.O. Box 174,
Farson, WY 82932
307-350-8683
edenvalleyirrigation@live.com

Project Manager:

Brian Deeter, PE
466 North 900 West,
Kaysville, UT 84037
801-547-0393
brd@JUB.com

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Applicant Info

Date: October 3, 2019

Applicant Name: Eden Valley Irrigation and Drainage District (EVIDD)

City, County, State: Farson, Sweetwater County, Wyoming

Project Manager:

Brian Deeter
Project Manager/Engineer
801.547.0393
brd@JUB.com

Project Funding Request: Funding Group II – $1,500,000 Total Project Cost – $3,125,000

Project Summary

Specify the work proposed, including how funds will be used to accomplish specific project activities and briefly identifies how the proposed project contributes to accomplishing the goals of this FOA.

The Eden Valley Irrigation and Drainage District (EVIDD or District) Farson Lateral Phase III Piping and Hydro Project will use funds to conserve 666 acre-feet of water per year with the piping of 6,200 feet of unlined laterals with 63-inch high-density polyethylene (HDPE) pipe.

Photo 1 Typical Cross Section of the Farson Lateral

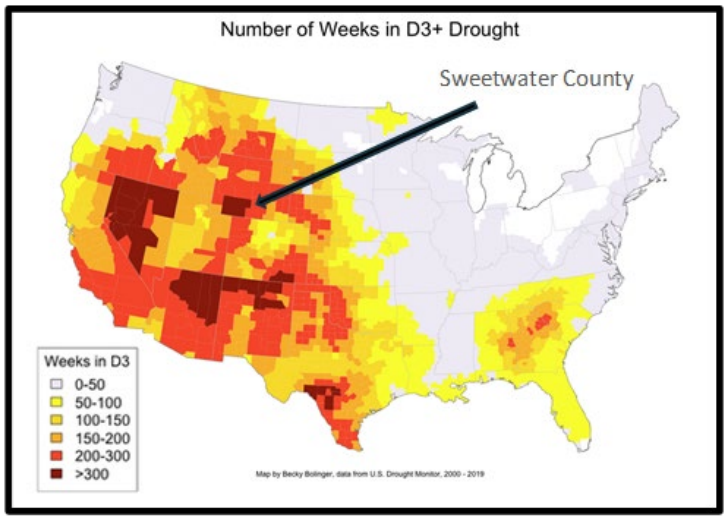
EVIDD receives much of its water from a direct diversion from the Big Sandy River. Just as the name might suggest, the natural earth lining the laterals consists of highly porous sandy soils, which makes the conversion to piped conveyance such an integral element of improving the District's irrigation system. The Farson Lateral was originally built as a border dike irrigation system with a few sub-irrigated systems in the Eden area. The lateral delivery design 60 years ago included a clay liner. Over the years, the liner has disintegrated, leaving areas that are sandy soils and native grasses. Since the year 2000, the region has endured a period of more than 300 weeks of extreme or significant drought conditions. Piping the Farson Lateral will conserve 666 acre-feet of water that is being lost to seepage and evaporation.

With 9,400 acre-feet of water passing through the Farson Lateral each irrigation season, the installation of solid wall, 63-inch HDPE pipe, will have a direct impact on water losses, ultimately conserving water and improving water reliability to the entire Farson Lateral, its users, and to the overall irrigation system.

The proposed project will contribute to the goals of this FOA in the following ways:

- **Conserve 666 acre-feet of water per year:** The proposed project will conserve and use water more efficiently by reducing seepage losses caused by highly pervious sandy soils in the unlined laterals.
- **Reduce future water conflict:** Updating the open, unlined Farson Lateral to piped conveyance will help mitigate existing conflicts and the risk of future water conflicts. Water seeps through the unlined lateral and pools into the ground. This has caused the water table to rise, salts to surface, and irrigation-induced wetlands to form around farmer's land.
- **Reliability of water:** The existing open canal is unlined and composed of native material, and the banks are vegetated with grasses or sagebrush. Water seeps into the sandy soil or evaporates as it travels. Sandy soil in the proposed project area has a low water holding capacity and has rapid permeability, rendering the current water delivery system inefficient and unsustainable in a region prone to drought. With over 300 weeks of drought in this area since 2000, water reliability has been a big issue for EVIDD. Piping the Farson Lateral will return water loss from seepage to the distribution system, where the full water right will be delivered to the users, decreasing the amount of water diverted each year just to reach the users. It will also reduce the amount of salts seeping into groundwater stores, and ultimately into the Colorado River System.

Figure 1 U.S. Drought Monitoring Map 2019



Length of Time and Estimated Completion Date

State the length of time and estimated completion date for the proposed project.

The contract process with the Bureau of Reclamation is anticipated to be completed by September 2020. The environmental reports and final design will take an estimated nine to twelve months to complete with advertising, bidding, and contract award in August 2021. Construction is anticipated to begin October 2021 and go through May 2023, outside of the irrigation season. As soon as construction is complete, the project will be closed out and the final reports prepared and submitted. The project is expected to span from September 2020 to September 2023, utilizing the three-year allowance.

Federal Facility

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

The Project is located on a federal facility. The Big Sandy Reservoir and the EVIDD Canal system were constructed in the 1950s by the Bureau of Reclamation (BOR).

Background Data

Irrigation was introduced in the valley in 1886 when settlers began to divert water from the Big and Little Sandy Rivers. Irrigation project activities started in the early 1900s with the Eden Irrigation and Land Company. Then, in the 1930s, additional companies formed, including the

Rock Springs Land and Water Company and the Wyoming Land and Water Company. Today, they have all combined to be one district known as the Eden Valley Irrigation and Drainage District (EVIDD). The District has increased the irrigated land in the Valley to the current 16,850 acres of the 17,088 water-righted acres.

The Big Sandy Project was established by the BOR and the Soil Conservation Service (SCS) between the mid-50s and mid-60s. Initially, the Reclamation project had approximately 18,700 irrigated acres that were platted and made available for sale.

Water Supply

Describe the source of water supply, the water rights involved, current water uses (e.g., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in the water supply. If water is primarily used for irrigation, describe major crops and total acres served.

Source of water supply and water rights involved.

Source of Water: There are two major reservoirs that supply EVIDD, the first is Eden Irrigation and Land Company No. 1 Reservoir, with a permitted storage of 18,490 acre-feet. The second is the Eden No. 2 Reservoir, which has been renamed the Big Sandy Reservoir, with a permitted storage of 39,700 acre-feet.

Water Rights: Surface water rights for EVIDD date back as far as 1887. Current water righted acreage in the service area is 17,009.8 acres. The most significant water right is the Eden Canal No. 1, also called the Means Canal. This is a diversion off the Big Sandy River, which is a tributary to the Green River. This water right has a total permitted flow of 1,386 cubic feet per second (cfs). The water is shared among various users (over 90 separate certificates) for irrigation and domestic use. The State Engineer's Office Permits 1 cfs to every 70 acres of irrigable land. This water right is a primary supply and a direct diversion from the Big Sandy River. All water deliveries are measured both at the head of major laterals and at each user's point of delivery.

Current water uses and number of water users served.

EVIDD water is primarily used for irrigation with additional minimal use for livestock watering. EVIDD serves 84 farms, averaging 200 acres per farm. Currently, the total farm population in the Eden Valley is 279 people. Additionally, 79 of the 84 farm operators are now part-time farmers with jobs off-farm to supplement farm income. The primary crops are alfalfa, grass hay, grain, and pasture.

EVIDD's total irrigated acreage is approximately 16,850 acres. Of these acres, approximately 75 percent are irrigated by sprinkler systems. Most of these acres are sprinkled using center pivots; 25 percent are flood irrigated. The most typical type of flood irrigation is furrow irrigation.

Current and projected water demand/potential shortfalls in water supply.

Current and Projected: EVIDD annually diverts approximately 82,000 acre-feet from the Big Sandy River with their water demand not expected to change. Approximately 9,400 acre-feet of water flows through the Farson Lateral every irrigation season.

Shortfalls: Water shortages occur during continued drought years, and years that have less than average snowfall in the winter. These deficiencies result in a shortened irrigation season, rather than cutting flows throughout the season. The unlined lateral is the main contributor to the water shortages and have been a source of frustration for the District and its water users, even on good water years. The entire Farson Lateral is intended to divert water from the Means Canal to over

3,750 acres of valuable farmland. The proposed project is the third phase of five phases of the Farson Lateral mentioned within the Master Plan. (See Attachment A – Farson Lateral Phasing Plan Map) This phase alone (6,200 feet) will conserve 666 acre-fee of water that is lost annually through this section of the Farson Lateral.

Photo 2 Big Sandy River near the Farson, Wyoming

The original Reclamation design called for a clay liner to be installed; however, that liner has almost completely deteriorated in the 60 years since it was constructed, causing seepage losses into the underlying soils. The name of the reservoir and the river that EVIDD receives their water through is "Big Sandy" – there is a lot of sand. The name "Big Sandy" is in reference to the soils present in the EVIDD service area. The sandy soils are highly pervious, and water quickly percolates into these soils.

If water is primarily used for irrigation, describe major crops and total acres served.

The major crops grown in the EVIDD service area are alfalfa, grass hay, pasture, and small grains; the total irrigated acres served is currently 16,850.

Water Delivery System

Describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (e.g., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

EVIDD's water delivery system consists of the Means, Eden, Farson, and other feeder canals. Much of these canals are currently unlined, with the exception of approximately 7,000 feet of the Eden Canal, which is lined with PVC membrane and shotcrete and one mile of the Farson Lateral that has been piped.

Photo 3 Farson Phase I Completed in 2016

The total length of the system canal is 17 miles. There are approximately 92 miles of irrigation laterals – 39 miles are currently piped, and 53 miles remain as open channels. There is also an existing sand trap that drains water into a shallow flat ditch then into open ground adjacent to the canal.

EVIDD is responsible for the maintenance of all canals, laterals and associated structures, including control structure, water measurement structures, drops, turnouts, culverts and other structures associated with canal and lateral operations.

Hydropower/Energy Efficiency

If the application includes a hydropower component, describe existing energy sources and current energy uses.

A 2-kW cross float hydro turbine will be placed in the canal that will produce 8,784 kilowatt-hours per year. This power will be used to help supplement the power needed to operate the SCADA or screens along the canal.

Relationship with Reclamation

Identify any past working relationships with Reclamation. This should include the date(s), description of prior relationships with Reclamation, and a description of the project(s).

EVIDD's original contract for construction of the Eden Project is dated 1950. The original obligation required repayment of $1,500,000 over 60 years with 0 percent interest. There have been multiple amendments to that contract. EVIDD's current annual payment to the BOR is $22,388 in biannual installments of $11,194. The current balance of their obligation is $257,468. The debt will be fully retired in 2028.

In addition, EVIDD has completed or is in the process of completing 4 different projects partially funded through the BOR's Salinity Reduction Program. BOR funding for these projects totals nearly $11,000,000.

In 2018, EVIDD received a WaterSMART grant for the Sand Trap Replacement & Eden Canal Lining Project in the amount of $300,000. They are under contract and moving forward with the Environmental process now.

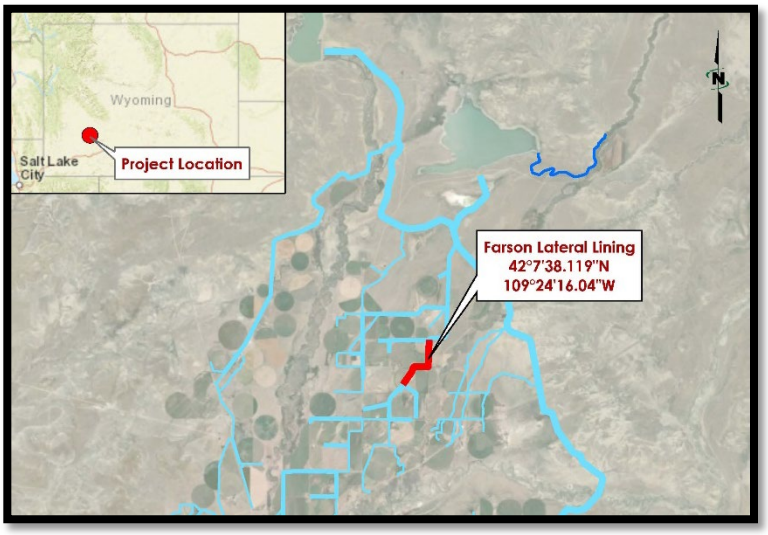
Project Location

Provide specific information on the proposed project location or project area including a map showing the geographic location.

Geographic Location

The EVIDD Farson Phase III Piping and Hydro Project is located in Sweetwater County, Wyoming, approximately 2 miles southeast of the town of Farson. The project latitude is 42°05'N, and longitude is 109°22'W. A map that shows the project location is found in Attachment B – Project Location Map, and a map detailing the proposed project area is found in Attachment C – Project Detail Map.

Figure 2 Project Location Map



Technical Project Description

Describe the work in detail, including specific activities that will be accomplished. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

The proposed project consists of replacing 6,200 feet of the open and unlined canal with 63-inch diameter solid wall HDPE pipe, building three turnouts, fencing removal and replacement, filling existing canal, and reseeding disturbed areas.

E.1. Technical Proposal: Evaluation Criteria

E.1.1. Evaluation Criterion A – Quantifiable Water Savings (30 Points)

Quantifiable Water Savings

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.

The amount of water expected to be conserved with piping 6,200 feet of the Farson Lateral is 666 acre-feet.

Describe current losses. Explain where the water that will be conserved is currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground).

The original clay canal liner has completely eroded away over the past 60 years, and the canal is considered unlined. The current water losses are primarily due to seepage into the underlying sandy soils. As the canal is open, there will be some evaporative losses as well.

Describe the support/documentation of estimated water savings. Provide sufficient detail supporting how the estimate was determined, including all supporting calculations.

Canal Lining/Piping

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.*

A Water Loss Study was performed in July 2018 by J-U-B Engineers, Inc. using a method based on the continuity equation to estimate the amount of water expected to be conserved by piping the reach of interest. The continuity equation states that assuming no change in storage, the discharge of water entering a system (inflow) must be equal to the discharge of water exiting the system (outflow). **The water loss study conducted in July 2018 covered a segment of the canal which is longer than the segment to be piped by this proposed project. However, the report provided a calculated annual water loss per foot of canal of 0.107 acre-feet per foot.** The total length of the section to be lined is 6,200 feet to the annual losses are easily calculated.

$$6{,}200\ ft\ \times 0.107\ \frac{AF}{year} = 666\ AF/year$$

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.*

Process: J-U-B Project Manager, Brian Deeter, and Project Engineer, Jonathan Frazier, visited the reach of interest on the afternoon of July 25, 2019, to collect inflow/outflow discharge measurements. The Farson Lateral is earth-lined for the entire length of the reach of interest. Two turnouts were in use during the period of measurement, as indicated in Table 1. An upstream measurement location was selected between the check/drop structure at STA

114+89 and turnout F-6 at the beginning of the reach of interest due to the reduced vegetation at the banks of the canal, and access to both banks using the check/drop structure bridge (Figure 2). The downstream measurement location was selected upstream of turnout F-12 and the check/drop structure at STA 201+52 at the end of the reach of interest due to the access to both banks using the check/drop structure bridge (Figure 3). EVIDD had been running water in the canal for several weeks prior to the measurements. (For information on the Water Loss process see Attachment D – July 2019 Water Loss Study)

Table 1 - Turnout discharges from EVIDD during the measurement period

Turnout	Discharge (cfs)
F-8	1.0
F-11B	2.0
F-11AH	0.5
Total Turnout Discharge	**3.5**

The StreamPro was tethered to a rope spanning the canal perpendicular to the flow (Figure 3 & Figure 4). Stakes with pulleys were pressed into the canal banks opposite each other. A rope was looped through the pulleys spanning the canal. The excess rope was coiled on the canal bank and controlled during each traverse. The StreamPro was tethered to a fixed point on the rope, and a drogue was installed around the control housing and allowed to float behind the StreamPro to increase stability. The bounding edges for the traverse were located by positioning the StreamPro as near the canal banks as possible while maintaining enough water depth to be discretized into two cells. This location was marked on the tether rope for repeatability.

Figure 4 Downstream Measurement Location

Figure 4 Upstream Measurement Location

Once the setup of the StreamPro was complete, data collection began. A stationary, moving bed test was performed to account for the potential flow of suspended sediments. Per standard practice, a minimum of ten

measurements were collected at each bank with the float stationary at the beginning and end of each traverse (Mueller & Wagner, 2009). Following the moving bed test, a minimum of four traverses were collected at each site with the float traverse speed 3 times less than the water velocity.

Conclusion: The measured surface water losses are assumed to be entirely from seepage and ET. It is assumed that the seepage losses will be mitigated, and ET losses eliminated by piping the reach of interest. EVIDD assumes HDPE pipe is 100 percent effective at reducing seepage. With 80 percent confidence, the canal piping project will result in a surface water savings of **930 ± 274 AFY**.

The rate of loss can be calculated by dividing the net seepage and ET outflow by the length between the inflow measurement and the outflow measurement (Equation 4).

$$q_{loss} = \frac{Q_{loss}}{l} \qquad \textit{(Equation 4)}$$

q_{loss} rate of outflow over a given reach [cfs/ft]
Q_{loss} outflow due to seepage and ET [cfs]
l length of the reach [ft]

$$q_{loss} = \frac{Q_{loss}}{l} = \frac{3.35 \pm 0.98}{8{,}663\ ft} = 0.00039 \mp 0.00011\ \frac{cfs}{ft}$$

Loss per Linear Foot: Similarly, the volume of loss per linear foot can be calculated by dividing the net seepage and ET volume loss by the length between the inflow measurement and the outflow measurement (Equation 5).

$$v_{loss} = \frac{V_{loss}}{l} \qquad \textit{(Equation 5)}$$

v_{loss} loss over a given reach [AFY/ft]
V_{loss} Total volume loss due to seepage and ET [AFY]
l length of the reach [ft]

$$v_{loss} = \frac{V_{loss}}{l} = \frac{930 \pm 274}{8{,}663\ ft} = 0.107 \mp 0.031\ \frac{AFY}{ft}$$

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)?*

The proposed pipe will be 100 percent watertight, so post-project losses are expected to be 0. The full 666 acre-feet will be saved.

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?*

The length of the project is 1.17 miles, and the losses are 666 acre-feet, so the loss per mile is 567 acre-feet per mile.

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

Flows into the Farson Lateral are metered. Each turnout above and within this project are metered. All of these meter readings are received by the District's SCADA. The outlet flow at the end of this project back into the open canal will not be metered but can be measured

using a portable flow meter. A simple inflow and outflow summary will verify actual seepage loss reduction.

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

Portable Flow Meter: The outlet flow at the end of this project back into the open canal will be measured using a portable flow meter and a simple inflow, and outflow summary will verify actual seepage loss reduction.

E.1.2. Evaluation Criterion B – Water Supply Reliability (18 Points)

Address how the project will increase water supply reliability. Provide sufficient explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

1. Will the project address a specific water reliability concern? Please address the following:

- *Explain and provide detail of the specific issue(s) in the area that is impacting water reliability, such as shortages due to drought, increased demand, or reduced deliveries. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?*

  In the western United States, drought will always be the primary issue impacting water reliability. However, seepage due to crumbling and failing infrastructure has caused additional water reliability concerns in the EVIDD service area. Because of the unlined, highly permeable floor and walls in the proposed portion of the Farson Lateral, water is seeping into the underlying soil instead of reaching the farms for which it was intended. As previously stated, water seepage is causing the water table in this area to rise and irrigation-induced wetlands to form. Also, because the lateral is an open waterway, water is being lost to evaporation. This project (Phase III) is another step toward addressing the heighten competition for water in this area.

- *Describe how the project will address the water reliability concern? In your response, address where the conserved water 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 address the water reliability concern described above by improving upon and completely converting a portion (6,200 feet) of the unlined open Farson lateral to piped conveyance. This will ensure that water diverted from the Means Canal and transported through the Farson Lateral (9,400 acre-feet of water) is being kept in the canal system and properly delivered to stockholders; rather than seeping into the ground, evaporating, or pooling on farms.

  The conserved water will remain in the Eden Canal to be properly delivered to EVIDD stockholders. Any water not used flows out the end of the system and back into the Big Sandy River.

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

  The Big Sandy and Eden Reservoirs store water from the Big Sandy and Little Sandy Rivers. Currently, the District diverts more water from the reservoirs than is required by the farms in order to account for water loss due to seepage. As the system is piped and seepage losses are eliminated, the water can be left in the two reservoirs and won't be delivered until it can be used for irrigation on the farms that need it. This will extend the irrigation season and increase crop production.

- *Indicate the quantity of conserved water that will be used for the intended purpose.*

  666 acre-feet will be conserved and put to beneficial use, providing irrigation for farms within the EVIDD service area.

2. *Will the project make water available to achieve multiple benefits or to benefit multiple water users? Consider the following:*

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

     Yes, reducing water loss through this project will benefit agricultural, environmental, and recreational users. Less water lost to seepage will require less water to be diverted from the Big Sandy Reservoir for irrigation, thus helping to maintain minimum water levels to support both environmental and recreational uses.

   - *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)? Describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project.*

     There are no known occurrences of threatened or endangered species in the proposed project area.

   - *Will the project benefit a larger initiative to address water reliability?*

     The Colorado River Drainage Basin has a commitment to reduce salts in the Colorado River. The water quality benefit from this project will be the unquantified salt and selenium reduction realized through piping the Farson Lateral. This will eliminate a constant flow of nearly 2.4 cfs currently percolating into the salty ground through the unlined lateral walls and reduce the amount of salt and selenium in the Colorado River Drainage Basin.

   - *Will the project benefit Indian tribes?*

     No, the project will not benefit Indian tribes.

   - *Will the project benefit rural or economically disadvantaged communities?*

     Farson, Wyoming is not considered an economically disadvantaged community, but it is a rural community that puts their trust in water reliability to grow their alfalfa, grass hay, pastures, and small grains. Without a reliable source of water, this community's economic sustainability is threatened. 79 of the 84 farm operators are now part-time farmers with jobs off-farm to supplement farm income.

   - *Describe how the project will help to achieve these multiple benefits. In your response, please address where the conserved water will go and where 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.*

     Piping the Farson Lateral will keep water previously lost through deep percolation in the delivery system, where it will make its way onto the rural farms for which it was intended. The efficient transport of such a valuable resource in a region prone to drought will be a much-needed improvement on the reliability of the EVIDD delivery system. Additionally, the impervious piping will prevent salinity seepage from reaching underground stores, reducing the amount of salt and selenium in the Colorado River Drainage Basin.

3. *Does the project promote and encourage collaboration among parties in a way the helps increase the reliability of the water supply?*

   The project is supported by local water users. The existing Farson Lateral is causing water to percolate into the ground where this "lost" water is raising the water table, causing salts to surface, and forming irrigation-induced wetlands. Local water users are serious about implementing solutions to the water loss issues facing the EVIDD service area and are in full support of the Farson Lateral piping.

- *Is there widespread support for the project?*

  Yes, local farmers, shareholders, and others are supportive of this project. EVIDD applied for Salinity funds in 2017 for this project, and they were not successful. However, Wyoming Water Development Office (WWDO) was in full support of this project. Within a letter approving this project for funding, WWDO has said that they have funded these types of projects in the past and will be willing to fund this type of project again for EVIDD.

- *What is the significance of the collaboration/support?*

  The WWDO was created to support water projects within the state, necessary to preserve Wyoming's water and related land resources. Through its Level III New Development and Rehabilitation Program, funding is available for the type of project EVIDD is proposing, which is the piping of the failing Farson unlined open lateral that has had a negative impact on Wyoming water and lands. By completing the proposed project, EVIDD will significantly reduce the amount of water being lost to the groundwater that is currently causing more harm than good by forcing the water table to rise, salts to surface, and irrigation-induced wetlands to form. Upon project completion, the EVIDD service area will be contributing to the mission of the WWDO to protect and preserve Wyoming's water and land resources. A letter confirming this support is found in Attachment E – EVIDD WWDO Funding Letter.

- *Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?*

  75 percent of farmers within the EVIDD service area already sprinkle their farms. Those who still use flood irrigation have expressed interest in the Natural Resources Conservation Service's (NRCS) funds to implement sprinkler irrigation. Given current water user's increased awareness of their current "water loss" situation, they will be even more motivated to implement future water conservation improvements.

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

  By converting the unlined open Farson Lateral to a piped conveyance, the proposed project will help to prevent a water-related crisis or conflict by realizing unquantified salt and selenium reductions. A constant flow of nearly 2.4 cfs, currently percolating into the salty ground adjacent to the Eden Canal, will be eliminated with this project, and the amount of salt and selenium in the Colorado River Drainage Basin will be reduced; mitigating current and future risk of water conflict.

  There will always be tension over western water resources, especially when those resources are not being properly delivered to farms. Agriculture is a huge part of life in the western United States, and when farmers cannot get enough water to produce quality crops or any crop at all, tensions will rise.

  One water-related crisis that has been brought up by local water users, and addressed by this project, is concern for "lost" water permeating into the sandy soil, where this excess water is causing the water table to rise, and if it rises too much, the area will flood and become an irrigation-induced wetland; completely useless to its owner. EVIDD is determined to minimize, if not mitigate, any tension over or concerns with the available water resources by mitigating the cause of water shortage; which in this case is seepage due to crumbling and failing infrastructure.

- *Describe the roles of any partners in the process. Please attach any relevant supporting documents.*
  WWDO was created to support water projects within the state. Funding is available for this type of project through its Level III New Development and Rehabilitation Program.

  A request for WWDO to help provide the matching funds has been submitted, and we are waiting on their response for their approval of a loan and some grant funds. The funding letter provided by the Wyoming Water Development Office is found in Attachment E – EVIDD WWDO Funding Letter. The funding applications are due in September and approved by the Wyoming Legislature in February. Over the past 10 years, WWDO has provided nearly $12M in matching funds to EVIDD projects jointly funded with Reclamation.

4. *Will the project address water supply reliability in other ways not described above?*
   None that have been discussed.

E.1.3. Evaluation Criterion C – Implementing Hydropower (18 Points)

If the proposed project includes construction or installation of a hydropower system, please address the following:

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

This project will include the installation of a cross float hydro turbine on the Eden Canal. The small hydropower generation site will provide an excellent source of renewable energy. That energy will be connected to the main electrical grid through a net-metering arrangement at the location of an existing turnout and center pivot. The small hydro site that is a part of this project is estimated at 2kW.

Describe the amount of energy generated. For projects that implement hydropower systems, state the estimated amount of energy that the system will generate (in kilowatt-hours per year). Provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

The small hydropower generation will operate the entire time that the canal is in use, from April 15th to October 15th. The turbine will operate for 4,392 hours during this time and will generate 8,784 kilowatt-hours per year.

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

- *Any expected reduction in the use of energy currently supplied through a Reclamation project.*
  This project will see a reduction in the required energy now used to power the screening and SCADA systems. This will benefit EVIDD as they reduce their reliance on the power grid.
- *Anticipated benefits to other sectors/entities.*
  Over a twenty-year span, this project could save enough energy to help reduce the carbon footprint of others who may be using a coal power plant. It would offset approximately 288,241 lbs. of CO2 over this twenty-year span, which is a reduction in a carbon footprint equivalent to:

The carbon footprint equivalent information above was provided by the United States Environmental Protection Agency Greenhouse Gas Equivalencies Calculator by entering the kilowatt-hours reduced and then multiplying the equivalent results of the reduced carbon dioxide emission by twenty years.

- *Expected water needs, if any, of the system.*
  No water will be needed.

E.1.4. Evaluation Criterion D – Complementing On-Farm Irrigation Improvements (10 Points)

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.*
    75 percent of the farms within the EVIDD service area irrigate with pump-assisted sprinkling systems. These irrigators understand that the benefits of sprinkling outweigh the cost of pumping and have already made that investment. The proposed piping project will provide some pressure, just not enough to eliminate pumping. However, the additional pressure can reduce pumping costs and encourage conversion to sprinklers, where they may not already be sprinkling. Currently, within the EVIDD service area, many of the existing near-farm and on-farm laterals have been piped. However, the topography of the service still requires pumping to run sprinklers. Those farmers located on piped laterals have connected their pumps directly to the piped lateral to take advantage of any of the pressure produced in the pipe. This helps offset pumping costs. The farmers who are located on open laterals utilize ponds for pumping water to run their sprinkling systems.
  - *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*
    Farmers representing an additional 254.12 irrigated acres have indicated interest in making the change from flood irrigation to sprinkler irrigation.
  - *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.*
    Signatures from farmers indicating interest in implementing sprinkler irrigation are found in Attachment F – On-farm Signatures and Map.
  - *Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*
    As stated above, signatures of intent are found in Attachment F – On-farm Signatures and Map.
- *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, installation of a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip irrigation.*
    N/A

    OR
  - *Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?*
    Yes, the proposed project will complement the on-farm project in the following ways:

- » Irrigators will have a dependable source of water that they can now count on, especially during the critical hot summer months when they rely on having the water for their crops.
- » Users at the end of the canal will now be able to get their full share of water, which they have been unable to receive in the past.
- » Develops more confidence in the Farson Lateral canal system, which would allow the farmer to make an investment in sprinkling and drip irrigation methods.

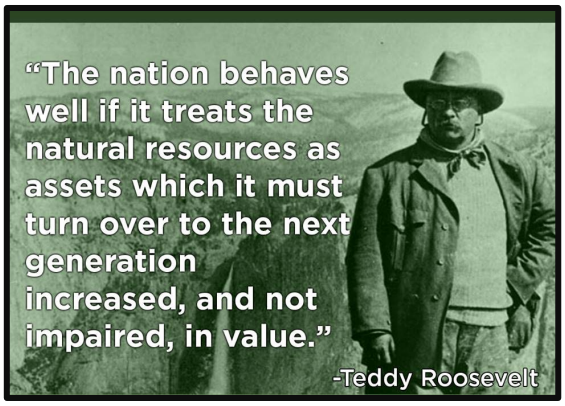
- *Describe the on-farm water conservation or water use efficiency benefits that would result from the on-farm component of this project.*
  - *Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

  Based on calculations and information available from the NRCS, flood irrigation is only 40 to 50 percent efficient compared to the 75 percent efficiency of sprinklers. Estimates have not been made for the potential savings for on-farm implementation projects. However, water savings already submitted as part of this application are substantial and would work towards having an impact on saving essential water resources in the area. The most meaningful benefit that comes from sprinkling an additional 254.12 acres, is a reduction in the excess flow of salts and nutrients from the land into the rivers. This alone will have an impact on all the water users and should be considered a significant water quality savings.

E.1.5. Evaluation Criterion E – Department of the Interior Priorities (10 Points)

Address those priorities that are applicable to your project. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the Priority(ies) is well supported in the proposal.

1. *Creating a conservation stewardship legacy second only to Teddy Roosevelt.*



Teddy Roosevelt once said, "The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired, in value." Like Teddy Roosevelt, EVIDD values the importance of expanding water capacity and resolving conflicts associated with America's valuable water resources, which it achieves through problem identification and maintenance of its water distribution system. Because of EVIDD's efforts to improve water reliance in their service area and water quality in surrounding water bodies, current and future generation water users can be assured that their valuable water resources will not be impaired, and by extension, neither will their crop production.

The proposed project will live up to this shared legacy by improving water delivery and water quality simultaneously, through the piping of the Farson Lateral. The modification to this water delivery system will keep America's valuable water resources from seeping into the ground and/or evaporating because of failing infrastructure and will reduce the amount of salt and selenium in the Colorado River Drainage Basin.

2. *Restoring trust with local communities.*

Certain reservoirs in the Green River Basin have permitted water storage for environmental and recreational uses. Environmental uses include water storage for fish and wildlife. The Big Sandy Reservoir is one of these reservoirs. If water losses are reduced, there will be less water called for by the farmers from the Big Sandy Reservoir, thus helping to maintain minimum water levels to support both environmental and recreational water uses. The 2010 Green River Basin Plan Update identifies estimated instream maintenance flows to support aquatic life for streams in the Green River Basin. This minimum flow for the Big Sandy is 29 cfs. Water that is diverted from the Big Sandy Reservoir into the EVIDD system that isn't used on farms stays in the system and makes its way back to the Big Sandy River and ultimately into the Green River. The elimination of seepage losses leaves more water in the system for the benefit of both irrigation and recreational water users.

EVIDD's local community has expressed many concerns regarding water reliability in the area. Most prominent is the concern that "lost" water is permeating into the sandy soil along the Farson Lateral, where it is retained or held up as a perched water table by the underlying shale. The rising water table holds salts in the soils, which can damage plants if it gets into the root zone. This excess water in the water table threatens crops, farmers, and their livelihood as it raises the water table and brings salts to the surface. EVIDD and its users understand that if nothing is done, this problem will only worsen, and eventually, these farms could become irrigation-induced wetlands. EVIDD seeks to resolve the issue and restore trust in their local communities through the proposed project, which will stop any further potentially negative impacts on the area.

3. *Modernizing our infrastructure.*

EVIDD's proposed project is an infrastructure improvement project. Its sole purpose is to improve water efficiency and quality by completely replacing old and outdated infrastructure with new and modernized infrastructure. Modern infrastructure design prides itself in outliving the useful life of old infrastructure design, such as EVIDD's unlined open lateral. The new pipes will replace an outdated system, and its useful life will be renewed. EVIDD seeks to provide its communities with the amount of water needed to ensure the production of quality crops. Providing new and modernized infrastructure is the way to do it.

E.1.6. Evaluation Criterion F – Implementation and Results (6 Points)

E.1.6.1. Subcriterion No. F.1 – Project Planning

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place.

Yes, EVIDD prepared a Master Plan – Level 1 Study in October 2017 to understand and prioritize opportunities for the modernization of their system moving forward. This plan identifies potential for delivery system and on-farm conservation opportunities and includes a strategic approach to pursuing available funding for prioritized projects identified within the Master Plan. A copy of EVIDD's Master Plan – Level 1 Study is available upon request.

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, or other planning efforts done to determine the priority of this project in relation to other potential projects.*

EVIDD's Master Plan provides support for the proposed Farson Lateral project. Under Section 5.2, Project Priorities, the piping of all un-piped Farson Laterals – F8 through F23 is listed as priority number two. Because of increased material and construction costs and

funding limitations, the size of the project presented in the Master Plan had to be reduced. It is still the same project, but just a portion of it will be constructed. The proposed project will pipe the Farson Lateral from F-8 up to F-11. EVIDD received a WaterSMART grant last year for their number one priority project — the Sand Trap Replacement & Eden Canal Lining – and it is currently under construction.

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).*

EVIDD project priorities were evaluated based on five criteria: EVIDD Preference, Water Efficiency, O&M Cost, Fundability, and Safety. Each project was given a score of 1 to 5 for each of these criteria, with a lower score giving it more importance. The proposed project plans to pipe the Farson Lateral from F8 through up to F11. The scores listed are for the piping of all un-piped Farson Lateral – F8 through F23 under each of these project priorities are as follows:

Table 2 Scoring for the Project Priority from the Master Plan

Rank	Description	Project Type	Recommendation	Note	EVIDD Preference	Water Use Efficiency	O&M Cost	Fundability	Safety	Score
2	Pipe all unpiped Farson laterals - F8 through F23	Modernization	F1 through F5 will be piped in 2018		2	1	2	1	5	11

E.1.6.2. Subcriterion No. F.2 – 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).

Performance measures for each aspect of the proposed project are as follows:

Upon completion of the project, a similar methodology that was used to calculate the losses will be employed post project. All of the measurement devices and recording procedures will still be in place. The results will be compared with pre-project data.

In addition, EVIDD will use a portable Acoustic Doupler Profiler to measure flows at the end of the new project. This will provide project-specific verification of post-project seepage losses that exist. Those post-project losses are expected to be at 0.

The hydro performance measures will also include documenting the amount of power produced each month during the irrigation season to quantify the actual benefits of the hydro energy generated. This information will be tracked over a series of years to understand the power production of the small hydro unit. This information will allow EVIDD to determine the viability of adding additional hydro units to other areas of the canal to help produce supplemental power to run other meters and screens within the system.

E.1.6.3. Subcriterion No. F.3 – Readiness to Proceed

Describe the implementation plan of the proposed project. Include an estimated project schedule that show the stages and duration of the proposed work, including major tasks, milestones, and dates.

The overall project schedule is included below. NEPA compliance typically takes 8 to 12 months. Construction must take place during two irrigation seasons – fall and winter months when irrigation water is out of the system. The following milestones represent completed tasks that are always on the critical path for piping projects.

Table 3 Schedule and Milestones

Item	Start Date	End Date
Award Notice and Contract	2/1/2020	7/1/2020
Environmental Compliance	8/1/2020	8/1/2021
Design	8/1/2020	8/1/2021
Bidding	8/1/2021	9/1/2021
Construction (will take two irrigation seasons)	Irrigation season #1- 10/1/2021 Irrigation season #2 -10/1/2022	5/1/2022 5/1/2023
Project Cleanup & Closeout	5/1/2023	8/1/2023

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

There will be no required permits or approvals associated with the proposed project.

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

For over eleven years, EVIDD has been working on other canal piping projects, including the Farson Lateral Phase 2 project, which is immediately upstream of this project. The Farson Lateral Phases 1 and 2 projects included hydraulic analysis and design, which had to consider the entire Farson Lateral. The Farson Lateral Phase II project is under construction at this time and will be completed in Spring 2020. J-U-B Engineers also completed a Master Plan — Level 1 Study for EVIDD in 2017 which identifies this project as a priority.

Describe any new policies or administrative actions required to implement the project.

There are no new policies or administrative actions required to implement the project.

Describe how the environmental compliance estimate was developed. Has the compliance cost been discussed with the local Reclamation office?

The environmental compliance estimate was based on typical historical costs from environmental work on over eleven years of federally funded projects on the EVIDD system. The local Reclamation office is aware of the proposed phasing of projects on the Farson Lateral. Environmental compliance on the previous two completed phases went through Reclamation's Provo, Utah office, as will this phase.

E.1.7. Evaluation Criterion G – Nexus to Reclamation Project Activities (4 Points)

Is the proposed project connected to Reclamation project activities? If so, how? Please consider the following:

- *Does the applicant receive Reclamation project water?*
  Yes, the Big Sandy Reservoir is a BOR project. This reservoir is the source of water for EVIDD via Eden Canal No. 1, known as the Means Canal. This water right is a primary supply and a direct diversion from the Big Sandy River.
- *Is the project on Reclamation project lands or involving Reclamation facilities?*
  Yes, the Big Sandy Reservoir and the EVIDD Canal system were constructed in the 1950s by the BOR.
- *Is the project in the same basin as a Reclamation project or activity?*
  Yes, as stated above, the proposed project involves two BOR projects: the EVIDD Canal system and its water source, the Big Sandy Reservoir.
- *Will the proposed work contribute water to a basin where a Reclamation project is located?*
  Yes, as previously stated, conserved water will reduce demand from farmers receiving water from the EVIDD Canal diversion, and therefore, the Big Sandy Reservoir. This will help maintain minimum water levels to support both environmental and recreational water uses.

– *Will the project benefit any tribe(s)?*
No.

E.1.8. Evaluation Criterion H – Additional Non-Federal Funding (4 Points)

State the percentage of non-federal funding provided using the following calculation: Non-Federal Funding divided by Total Project Cost.

$$\frac{\$1,682,900.00 \text{ EVIDD Funding}}{\$3,182,900.00 \text{ Total Project Cost}} = 53\%$$

53% of the funding will come from the EVIDD and the State of Wyoming. That funding application was submitted August 2019. Wyoming funding applications must be approved by the Wyoming legislature in their regular annual session in February 2020.

Table 4 Percentage of Non-Federal and Federal Funding Sources

FUNDING SOURCES	***% of Total Project Cost***	***Total Cost by Source***
Recipient Funding	0%	$0.00
Reclamation Funding	47%	$1,500,000.00
Other Federal Funding (WWCD)	53%	$1,682,900.00
Totals	100%	$3,182,900.00

Project Budget

Funding Plan and Letters of Commitment

Describe how the non-Federal share of project costs will be obtained.

EVIDD has applied for loan and grant funds and is awaiting approval for funding from the WWDO for 53 percent of this project. The funding letter provided by the Wyoming Water Development Office is found in Attachment E – EVIDD WWDO Funding Letter.

Identify the sources of the non-Federal cost-share contribution for the project, including:

- *Any monetary contribution by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments).*
  No.
- *Any costs that will be contributed by the applicant.*
  There will be no costs contributed by applicant.
- *Any third-party in-kind costs (i.e., goods and services provided by a third party).*
  There are no third-party in-kind costs.
- *Any cash requested or received from other non-Federal entities.*
  Yes. As stated previously, EVIDD has requested loan and grant funds from WWDO.
- *Any pending funding requests (i.e., grants or loans) that have not yet been approved and explain how the project will be affected if such funding is denied.*
  There is a pending funding request with the Wyoming Water Development Office. WWDO staff will make their recommendation to the Wyoming Legislature prior to the annual legislative session in February 2020. If funding is denied this year, EVIDD can reapply in August 2020 and will likely receive a higher ranking for being denied the previous year. Since 2008, the WWDO has approved over $14 million in funding for EVIDD projects. All of this funding has been matching funds for federally funded projects.

In addition, identify whether the budget proposal includes any project costs that have been or may be incurred prior to award. For each cost, describe:

- *The project expenditure and amount.*
  N/A
- *The date of cost incurrence.*
  N/A
- *How the expenditure benefits the Project.*
  N/A

Budget Proposal

Table 5 Total Project Cost Table

Source	Amount
Costs to be reimbursed with the requested Federal funding	$1,500,000.00
Costs to be paid by the applicant	$1,682,900.00
Value of third-party contributions	$0.00
Total Project Cost	**$3,182,900.00**

Table 6 Project Budget

Budget Item Description	Computation		Quantity Type	Total Cost
	$/Unit	Quantity		
Salaries and Wages	$0.00	-	-	$0.00
Fringe Benefits	$0.00	-	-	$0.00
Equipment	$0.00	-	-	$0.00
Supplies and Materials	$0.00	-	-	$0.00
Contractual /Construction				**$526,000.00**
Contractual				
Design	$210,000	1	EA	$210,000.00
NEPA Compliance	$106,000	1	EA	$106,000.00
Construction Management	$210,000	1	EA	$210,000.00
Construction				$2,656,900.00
Mobilization	$210,000	1	EA	$210,000.00
63" HDPE DR 41 PIPE	$292	6,200	LF	$1,810,400.00
Fittings	$50,000	1	EA	$50,000.00
Air Valve Assembly	$7,500	5	EA	$37,500.00
Turnout Assemblies	$36,000	3	EA	$108,000.00
RTU & Solar	$17,000	3	EA	$51,000.00
Remove and Replace Existing Fence	$10.00	1,500	LF	$15,000.00
Remove Structures	$4,000	10	LS	$40,000.00
Dewatering	$35,000	1	LS	$35,000.00
Furnish Imported Trench Backfill Type A1	$24	1,500	TON	$36,000.00
Furnish Foundation Type A5	$40	1,000	TON	$40,000.00
Furnish Untreated Base Course Type A7	$46	200	TON	$9,200.00
Earthwork	$6	13,000	CY	$78,000.00
Fill Existing Canal	$7	6,200	LF	$43,400.00
Reseeding	$20,000	1	LS	$20,000.00
Pipe Markers	$100	24	EA	$2,400.00
Temporary Outlet Structure	$55,000	1	EA	$55,000.00
2kW Micro Hydro	$16,000	1	EA	$16,000.00
Third-Party In-Kind Contributions				**$0.00**
Other				**$0.00**
Total Direct Costs				**$3,182,900.00**
Indirect Costs				**$0.00**
Type of rate	Percentage	$base		N/A
Total Estimated Project Costs				**$3,182,900.00**

Budget Narrative

Salaries and Wages

No separate salaries or wages outside of contractual costs will be included.

Fringe Benefits

No separate fringe benefits will be included.

Travel

No separate travel costs will be included.

Equipment

No separate equipment costs will be included. All of these costs are included in the contractual contracts.

Materials and Supplies

No separate materials and supplies costs will be included. All of these costs are included in the contractual contracts.

Contractual

In order to determine unit costs, which were included in the cost estimate for this project, EVIDD relied upon contract unit prices from similar projects recently completed for similar projects. EVIDD follows the State of Wyoming procurement process for procuring a contractor for this project. They will bid the construction portion of the project to several prequalified construction companies. The contractual costs shown are estimates for each of the components to furnish and install all the pipe, hydro, and other equipment. Generally, the low bidder will be selected based on a determination of acceptable qualifications.

The contractual for the proposed project will include design, construction management, NEPA, mobilization, furnishing, and installing HDPE pipe, hydro, and other miscellaneous items listed within the budget.

Third-Party In-Kind Contributions

There are no third-party in-kind contributions.

Environmental and Regulatory Compliance Costs

It is anticipated that the environmental document will be a categorical exclusion, in that EVIDD will be working within the existing canal alignment, which has been disturbed and had continued to be disturbed over the past 20 years or so. It is expected that it will take $106,000 to evaluate the required information, prepare the report, and update any changes required from BOR after their review of the proposed project. The total cost is 4 percent of the project, which includes the $35,000 for review by the BOR.

Other Expenses

There are no other expenses.

Indirect Costs

No indirect costs will be part of the proposed project.

Total Costs

EVIDD Portion: $1,682,900.00 Fed Portion: $1,500,000.00 Total: $3,182,900.00

Environmental and Cultural Resources Compliance

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

Impacts will be those associated with the piping of the existing Farson Lateral. The proposed project improvements will take place entirely within the existing right-of-way. In the past, similar projects have had minimal impacts. The existing open ditch prism will be filled during installation of the pipeline with existing excess material, and surface vegetation will be restored upon completion of the project.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

EVIDD is not aware of any impacts concerning threatened or endangered species in this area.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

EVIDD is not aware of any impacts to wetlands in this area.

When was the water delivery system constructed?

Many improvements have been done over the years. As part of the completed environmental document, the required historical documentation for the project will be completed.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

This project will pipe Farson Lateral F8 up to F11. The laterals were originally part of the canal as a border dike irrigation system with a few sub-irrigated systems.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

EVIDD is not aware of any building, structures, or features that would qualify. A cultural resource inventory will be completed as part of the submitted environmental document.

Are there any known archeological sites in the proposed project area?

EVIDD is not aware of any impacts to or locations of archeological sites.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

No, the project will not require a right-of-way or relocations from adjacent properties and will have no impact on residential uses within the study area.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

No.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No.

Required Permits or Approvals

Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

There will be no required permits or approvals associated with the proposed project.

Letters of Project Support

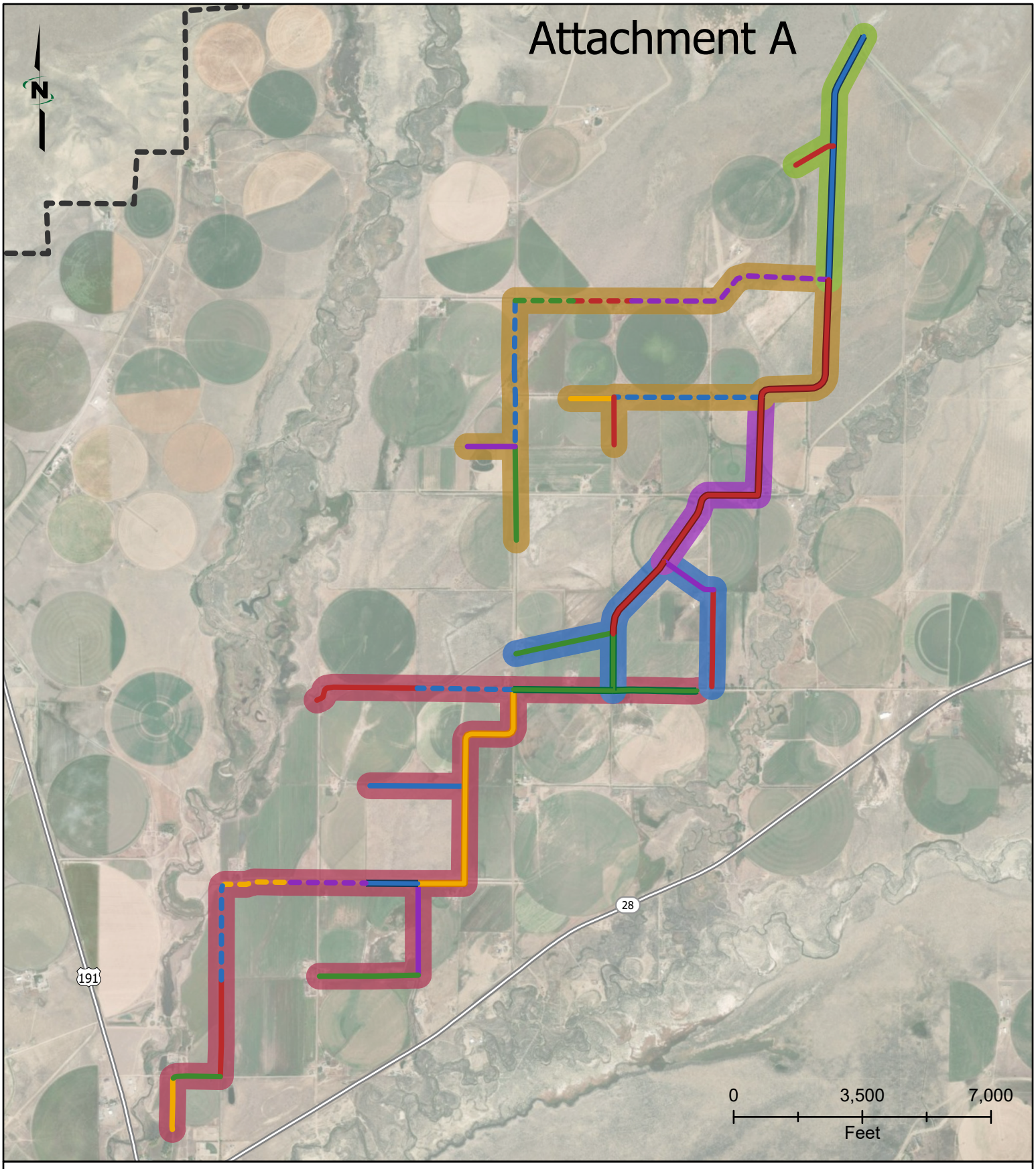
Include letters from interested stakeholders supporting the proposed project.

As stated under Funding Plan and Letters of Commitment, EVIDD has applied for funding from the Wyoming Water Development Office (WWDO) to help bring their 53 percent to this project. The funding letter provided by the Wyoming Water Development Office is found in Attachment E – EVIDD WWDO Funding Letter.

Official Resolution

Include an official resolution adopted by the applicant's board of directors or governing body. The official resolution may be submitted up to 30 days after the application deadline.

The Official Resolution for the Eden Valley Irrigation and Drainage District (EVIDD) Farson Phase III Piping and Hydro Project is included as Attachment G.



Farson Lateral Phasing From Master Plan

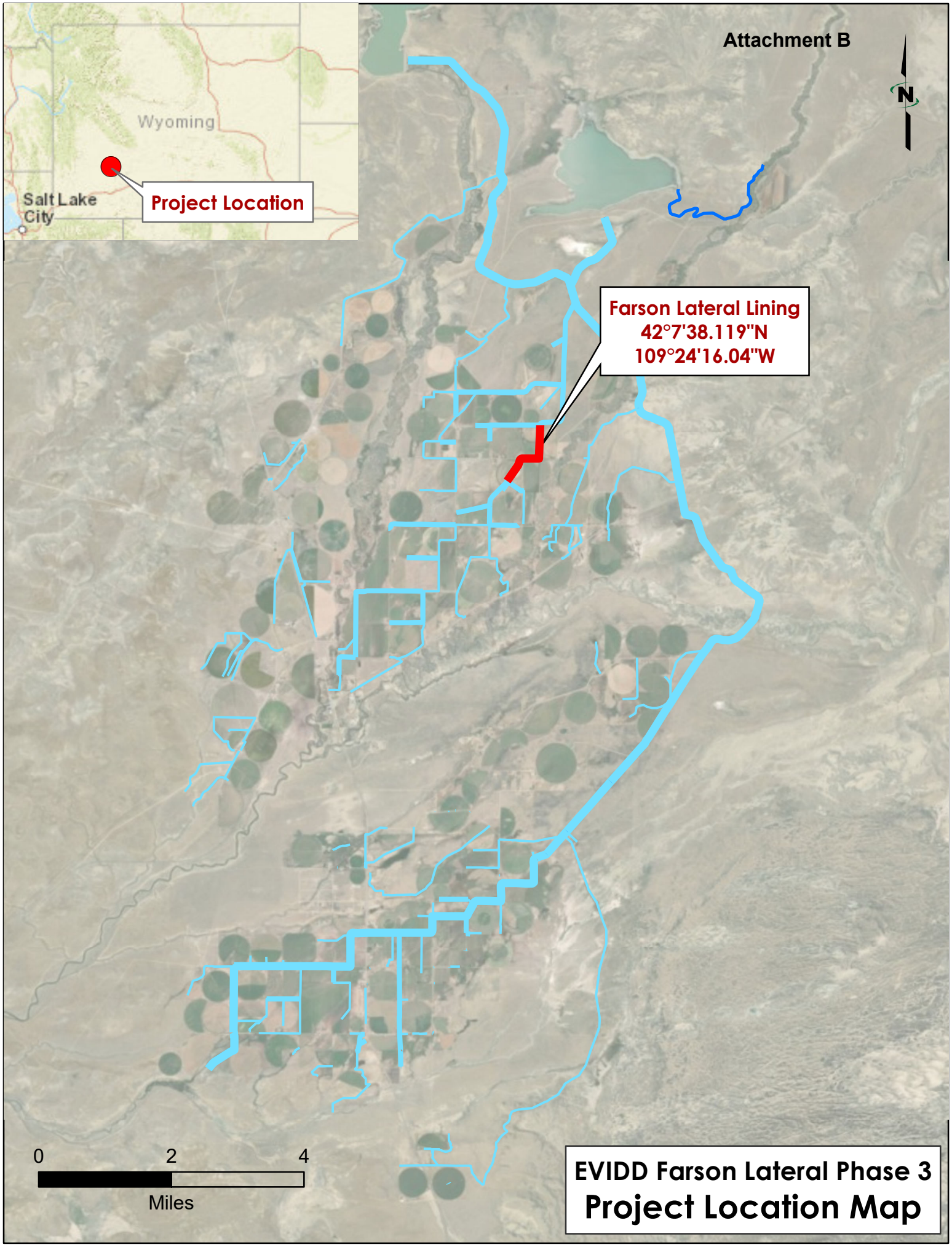
Appendix A-3

November 2017
Updated August 2019

Phases
- 1 (Completed)
- 2 (Under Construction)
- 3 (Future)
- 4 (Future)
- 5 (Future)

- 10" DR 32.5
- 12" DR 32.5
- 16" DR 32.5
- 18" DR 32.5
- 20" DR 32.5
- 24" DR 41
- 26" DR 41
- 30" DR 41
- 32" DR 41
- 34" DR 41
- 36" DR 41
- 42" DR 41
- 54" DR 41
- 63" DR 41

JUB ENGINEERS, INC. | THE LANGDON GROUP | GATEWAY MAPPING INC. | OTHER J-U-B COMPANIES


Attachment B
N
Wyoming
Salt Lake City
Project Location
Farson Lateral Lining
42°7'38.119"N
109°24'16.04"W
0
2
4
Miles
EVIDD Farson Lateral Phase 3
Project Location Map


Attachment C
N
Legend
63" DR 41
Farson Phase 3 Project
0
600
1,200
Feet
J·U·B ENGINEERS, INC.
THE LANGDON GROUP
a J-U-B Company
GATEWAY MAPPING INC.
a J-U-B Company
OTHER J-U-B COMPANIES

FARSON LATERAL: F-6 to F-12
WATER LOSS MEASUREMENTS

Eden Valley Irrigation & Drainage District

Sweetwater County, Wyoming

Brian Deeter, PE – Project Manager

Jonathan Frazier, SE – Project Engineer

J-U-B

THE LANGDON GROUP

GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Kaysville Office

466 North 900 West

Kaysville, Utah 84037

Acronyms and Abbreviations

ADCP	acoustic Doppler current profiler
AFY	acre-feet per year [L3/T]
cfs	cubic feet per second [L3/T]
ET	Evapotranspiration
EVIDD	Eden Valley Irrigation and Drainage District
ft	feet [L]
HDPE	High-Density Polyethylene
hrs	hours [T]
in	inches [L]
mi	miles [L]
PVC	Polyvinyl Chloride
Reclamation	Bureau of Reclamation
SMART	Sustain and Manage America's Resources for Tomorrow
WEEG	Water and Energy Efficiency Grant

Methods

J-U-B used a method based on the continuity equation to estimate the amount of water expected to be conserved by piping the reach of interest. The continuity equation states that, assuming no change in storage, the discharge of water entering a system (inflow) must be equal to the discharge of water exiting the system (outflow) (Figure 1). In this case the "system" is the reach of interest. Other possible inflows include precipitation and groundwater; however, it is assumed that these inflows are, at the very least, negligible since: no precipitation occurred during the measurement period, and the groundwater table in the region is below the canal bottom elevation. Seepage, ET, usage and the volume of water exiting the reach of interest are assumed to be the only outflows. The reach of interest had two turnouts in operation during the measurement period (Table 1). The combination of seepage and ET outflows can be estimated by measuring the difference between the upstream discharge and the combination of the downstream discharge and usage discharge ($Q_{loss} = Q_{inflow} - (Q_{outflow} - Q_{turnout})$ *(Equation 1*).

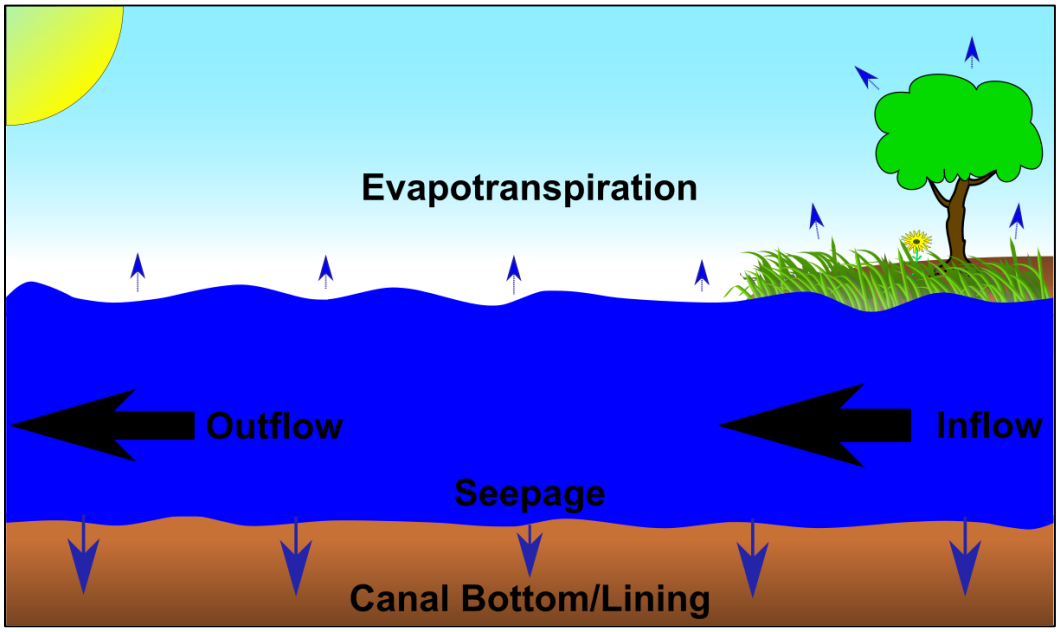


Figure 1 - Schematic depiction of the inflows and outflows of the reach of interest.

$$Q_{loss} = Q_{inflow} - (Q_{outflow} - Q_{turnout}) \qquad \textit{(Equation 1)}$$

Q_{inflow}	inflow measurement [cfs]
$Q_{outflow}$	outflow measurement [cfs]
$Q_{turnout}$	outflow due to usage [cfs]
Q_{loss}	outflow due to seepage and ET [cfs]

The continuity equation is used to establish the approximate outflow due to seepage and ET.

Data Collection

Measurement Equipment Theory

Discharge measurements were made using a *StreamPro* (*Teledyne RD Instruments*) piston-type, acoustic Doppler current profiler (ADCP) (Figure 2) and companion data collection software *WinRiver II* (*Teledyne RD Instruments*). The ADCP measures water velocity at discrete depth intervals as it traverses the canal profile. Velocities are measured by emitting high frequency sound waves and measuring the frequency shift of the reflected wave. Depth of the velocity measurement is calculated by the two-way travel time of the wave. The cross section of the canal, perpendicular to the direction of flow, is discretized into cells. The velocity within each cell is approximated from multiple measurements by the ADCP. After the transverse is complete, the discharge over the measured portion of the canal cross section can be calculated by summing the products of the velocity and area of each cell (Figure 3). Due to ADCP measurement constraints, portions of flow through the top, bottom, and sides of the canal cross-section cannot be measured. The discharge through these areas is approximated. Discharge near the banks is estimated by assuming a triangular cross-sectional area with dimensions of the depth measured by the ADCP near the bank and the user measured distance from the ADCP to the bank. The velocity through the triangular area is approximated using the average velocity in the nearest ensemble of cells and a scaling factor of 0.35 (Teledyne RD Instruments (2008)). The velocity through the top and bottom is estimated by fitting a best-fit power curve to the measured velocity profile. The curve is then extrapolated to the water surface and canal bottom. The top and bottom areas are calculated by user entered values and ADCP measurements.

Figure 2 - Teledyne RD Instruments' StreamPro ADCP. Similarly equipped to model used. (Teledyne Marine, 2004)

When collecting measurements, it is desirable for the canal to be straight and unobstructed for approximately 10x the canal width upstream of the measurement location. This allows flow to be conditioned by reducing turbulence and interaction with the hyporheic zone[1]. Absence of vegetation also increases measurement accuracy. Vegetation can cause turbulence and interfere with sound waves generated by the ADCP.

[1] The hyporheic zone is a subsurface volume of porous media beneath and alongside a stream/canal through which surface water readily exchanges.

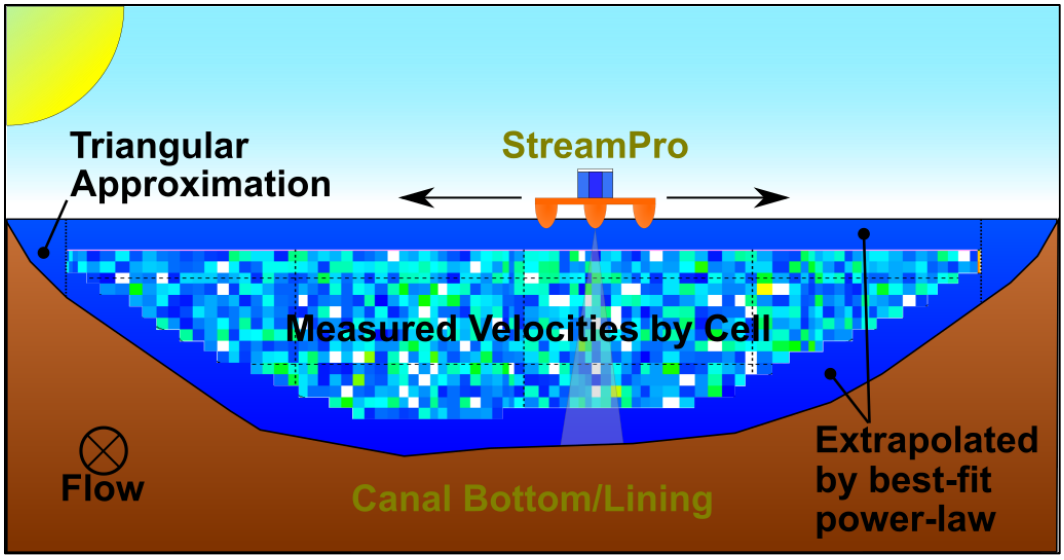


Figure 3 - Schematic depiction of the StreamPro collecting a measurement and the resulting discretization of the flow into cells. The colors of the cells represent varying velocities. The discharge through the area around the perimeter of the cells, in blue, is estimated. Flow direction in the canal is into the page.

Measurement Site Selection & Description

J-U-B Project Manager, Brian Deeter, and Project Engineer, Jonathan Frazier, visited the reach of interest on the afternoon of July 25, 2019 to collect inflow/outflow discharge measurements. The Farson Lateral is earth lined for the entire length of the reach of interest. Two turnouts were in use during the period of measurement as indicated in Table 1. An upstream measurement location was selected between the check/drop structure at STA 114+89 and turnout F-6 at the beginning of the reach of interest due to the reduced vegetation at the banks of the canal, and access to both banks using the check/drop structure bridge (Figure 4). The downstream measurement location was selected upstream of turnout F-12 and the check/drop structure at STA 201+52 at the end of the reach of interest due to the access to both banks using the check/drop structure bridge (Figure 5). EVIDD had been running water in the canal for several weeks prior to the measurements.

Table 1 - Turnout discharges from EVIDD during the measurement period

Turnout	Discharge (cfs)
F-8	1.0
F-11B	2.0
F-11AH	0.5
Total Turnout Discharge	**3.5**

Measurement Site and Setup Description

Measurement Setup Description

The StreamPro was tethered to a rope spanning the canal perpendicular to the flow (Figure 4 & Figure 5). Stakes with pulleys were pressed into the canal banks opposite each other. A rope

was looped through the pulleys spanning the canal. The excess rope was coiled on the canal bank and controlled during each traverse. The StreamPro was tethered to a fixed point on the rope, and a drogue was installed around the control housing and allowed to float behind the StreamPro to increase stability. The bounding edges for the traverse were located by positioning the StreamPro as near the canal banks as possible while maintaining enough water depth to be discretized into two cells. This location was marked on the tether rope for repeatability.

Once the setup of the StreamPro was complete, data collection began. A stationary moving bed test was performed to account for the potential flow of suspended sediments. Per standard practice, a minimum of ten measurements were collected at each bank with the float stationary at the beginning and end of each traverse (Mueller & Wagner, 2009). Following the moving bed test, a minimum of four traverses were collected at each site with the float traverse speed 3x less than the water velocity.

Upstream Measurement Location – STA 114+89

The upstream measurement location was located at approximately STA 114+89 of the Farson Lateral. The canal was earth lined with vegetated canal banks. There was a 90° bend in the canal upstream of measurement location and a concrete check/drop structure downstream. There were no visual eddies or areas of turbulence in the water surface at the measurement location due to the influence of the check structure stilling the water. The high turbidity of the water did not allow visual inspection for vegetation on the submerged portion of the canal.

Figure 4 - Upstream measurement location

Downstream Measurement Location – STA 201+42

The downstream measurement location was located at approximately STA 201+42 of the Farson Lateral. The canal was earth lined with vegetated canal banks. The canal was straight for several hundred feet upstream of the measurement location and a concrete check/drop

structure was several feet downstream. The high turbidity of the water did not allow visual inspection for vegetation on the submerged portion of the canal.

Figure 5 - Downstream measurement location

Data Processing

ADCP discharge data were processed using *WinRiver II (Teledyne RD Instruments)*. Four transects were collected at the upstream location, and six transects were collected at the downstream location. A combination of transects which had good total discharge agreement were selected for inclusion in the average for the final, total discharge. Due to the possibility of traverse directional bias (i.e. travel from the left to the right bank or visa-versa), an equal number of left and right transects were included in the final discharge measurement.

Assuming the transect total discharge measurement population is normally distributed, the confidence intervals for the mean total discharge ($\bar{X}$) were calculated using the t distribution, standard deviation of the transect total discharge data sets (S), and the number of transects used in the mean total discharge calculation (n) (Spiegel, Schiller, & Srinivasan, 2013). The t distribution was used in place of the Normal distribution since n is less than 30. Standard deviations were calculated by *WinRiver II* and measurement summaries presented in Appendix A (page x). The confidence intervals are then calculated by:

$$\bar{X} \pm t_c \frac{S}{\sqrt{n}} \qquad \textit{(Equation 2)}$$

Where t_c is the t distribution critical value read from a table based on the desired confidence level and the degrees of freedom ($n-1$). The confidence interval for the difference between the two total discharge means ($\bar{X}_1$ and $\bar{X}_2$):

$$\bar{X}_1 - \bar{X}_2 \pm t_c \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \qquad \textit{(Equation3)}$$

Results

Total measured discharge of the measurement sites is presented in sequential order in Table 2. 80% confidence intervals were calculated using the t distribution ($\bar{X} \pm t_c \frac{S}{\sqrt{n}}$ *(Equation 2*). Summary details for each measurement can be found in Appendix A (page x).

Table 2 - Discharges from measurement locations and associated 80% confidence intervals.

Location	Discharge (cfs)
Upstream – STA 114+89	35.9 ± 0.83
Downstream – STA 201+52	29.0 ± 0.53

Discussion

The losses for the measured reach of interest can be estimated using the difference between the two total discharge means less the turnout discharge ($\bar{X}_1 - \bar{X}_2 \pm t_c \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$ *(Equation*). The difference in discharge measurements less the turnout discharge indicates 3.35 ± 0.98 cfs in losses over the measured reach under these flow conditions. With 80% confidence, this yields approximate annual surface water loss of 817 ± 239 AFY (Table 3).

Table 3 - Estimation of surface water losses from the measured reach of interest with 80% confidence intervals

Upstream – STA 114+89 (cfs):	35.9 ± 0.83
Downstream – STA 201+52 (cfs):	29.0 ± 0.53
Turnouts (cfs):	3.5
Measured Reach Losses (cfs):	3.35 ± 0.98
Irrigation Season Duration (days):	140
Annual Loss (AFY):	930 ± 274

These estimated losses in terms of raw flow loss and resulting volume lost are representative of the flows seen on the day of the testing. However, the percentage of water loss can be assumed to represent other daily flow rates and annual flow volume.

Conclusions

The measured surface water losses are assumed to be entirely from seepage and ET. It is assumed that the seepage losses will be mitigated and ET losses eliminated by piping the reach of interest. EVIDD assumes HDPE pipe is 100% effective at reducing seepage. With 80% confidence, the canal piping project will result in a surface water savings of **930 ± 274 AFY**.

The rate of loss can be calculated by dividing the net seepage and ET outflow by the length between the inflow measurement and the outflow measurement (Equation 4).

$$q_{loss} = \frac{Q_{loss}}{l} \qquad \textit{(Equation 4)}$$

q_{loss} rate of outflow over a given reach [cfs/ft]
Q_{loss} outflow due to seepage and ET [cfs]
l length of the reach [ft]

$$q_{loss} = \frac{Q_{loss}}{l} = \frac{3.35 \pm 0.98}{8{,}663\ ft} = 0.00039\ \mp 0.00011\ \frac{cfs}{ft}$$

Similarly, the volume of loss per linear foot can be calculated by dividing the net seepage and ET volume loss by the length between the inflow measurement and the outflow measurement (Equation 5).

$$v_{loss} = \frac{V_{loss}}{l} \qquad \textit{(Equation 5)}$$

v_{loss} loss over a given reach [AFY/ft]
V_{loss} Total volume loss due to seepage and ET [AFY]
l length of the reach [ft]

$$v_{loss} = \frac{V_{loss}}{l} = \frac{930 \pm 274}{8{,}663\ ft} = 0.107\ \mp 0.031\ \frac{AFY}{ft}$$

Attachment E

WYOMING WATER DEVELOPMENT OFFICE

6920 Yellowtail Road
Cheyenne, WY 82002

Phone: (307) 777-7626
wwdc.state.wy.us

September 16, 2019

Ed Burton, Chairman
Eden Valley Irrigation and Drainage District
13 WY-28
Farson, WY 82932

RE: Eden Valley Irrigation and Drainage District's Funding Request

Dear Mr. Burton –

They Wyoming Water Development Commission (WWDC) is in receipt of Eden Valley Irrigation and Drainage District's (EVIDD) project application for the Farson Phase 3 lateral. This project is similar to projects WWDC has funded in the past. Additionally, this type of project has been funded through Reclamation's FOA program and Wyoming's Basin States Program. However, there is high demand for WWDC Account II Rehabilitation funding. EVIDD's project will be considered along with other project applications. The Wyoming Water Development Office (WWDO) understands WWDC's funding importance when seeking Reclamation funding for salinity reduction projects.

Sincerely,

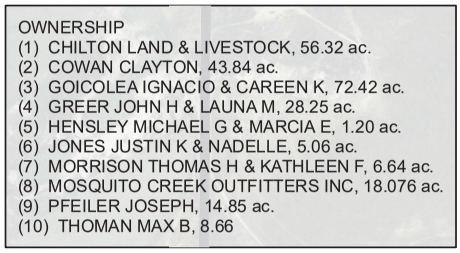
Jason Mead

Jason Mead, P.E.
Acting Director
Wyoming Water Development Office

Attachment F -- Estimate of Enabled On-farm Acreage

Name of Canal/Lateral/Ditch: Farson Lateral, Phase III

Delivery ID (Corresponding to GIS Map)	Landowner name	Proposed Irrigation Method	Irrigated 2 out of the last 5 years Yes or No	Claimable acreage (Corresponding to GIS Map)	Landowner signature I have an interest to install a high-efficiency irrigation system (on the fields represented by the ID number) when sufficient water quantity, quality, and application requirements are met.
1	Chilton Land & Livestock	Pivot	Yes	56.32	
2	Clayton Cowan	Wheel Line	Yes	43.84	
3	Ignacio & Careen K. Goicolea	Pivot	Yes	72.42	
4	John H. & Launa M Greer	Pivot	Yes	28.25	
5	Michael G & Marcia E. Hensley	Pivot	Yes	1.2	
6	Justin K. & Nadelle Jones	Pivot	Yes	5.06	
7	Thomas H. & Kathleen F. Morrison	Wheel Line	Yes	6.64	
8	Mosquito Creek Outfitters, Inc.	Wheel Line	Yes	18.08	
9	Joseph Pfeiler	Pivot	Yes	14.85	
10	~~Mary B. Thomas~~ Justin Jones	Pivot	Yes	8.66	
	TOTAL ACRES CLAIMED			254.12	



Farson Lateral
On-Farm Opportunities

Farson Lateral Phase 3
Existing Piped Lateral
Unpiped Lateral
Flood Irrigated Acres
Parcels

0 0.25 Miles

N

OFFICIAL RESOLUTION

RESOLUTION NO. BOR-DO-20-F001

Eden Valley Irrigation and Drainage District

WHEREAS, The **Eden Valley Irrigation and Drainage District** must maintain, provide for, and service the Water System,

WHEREAS, The **District** sees the need to construct the **Eden Valley Irrigation and Drainage District Farson Lateral Phase III Piping and Hydro Project** to improve water and energy conservation and efficiency,

WHEREAS, The **District** desires to obtain grant funding from the Bureau of Reclamation through the **WaterSMART: Water and Energy Efficiency Grant.**

NOW THEREFORE, BE IT RESOLVED that the **Board of Directors**, agrees and authorizes that:

1. The **President** of **Eden Valley Irrigation and Drainage District** has the legal authority to enter into an agreement with Reclamation;

2. The **WaterSMART: Water and Energy Efficiency Grant** application prepared by **J-U-B Engineers, Inc.** has been reviewed by the **Board of Directors** and supports the application submitted;

3. The **Eden Valley Irrigation and Drainage District** is capable of providing the amount of funding and/or in-kind contributions specified in the funding plan; and

4. If selected for a **WaterSMART: Water and Energy Efficiency Grant**, the **District** will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

DATED: 4/26/19

Ed Burton, President

ATTEST:

Brandon Long District Manager

Name, Title