WaterSMART Grants: Water and Energy Efficiency Grants
FOA# BOR-DO-18-F006

Eden Valley Irrigation & Drainage District

FY 2018

Sand Trap Replacement & Eden Canal Lining Project

Applicant

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Applicant Info

Date: May 10, 2018

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

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

Project Manager:

Brian Deeter
Project Manager/Engineer
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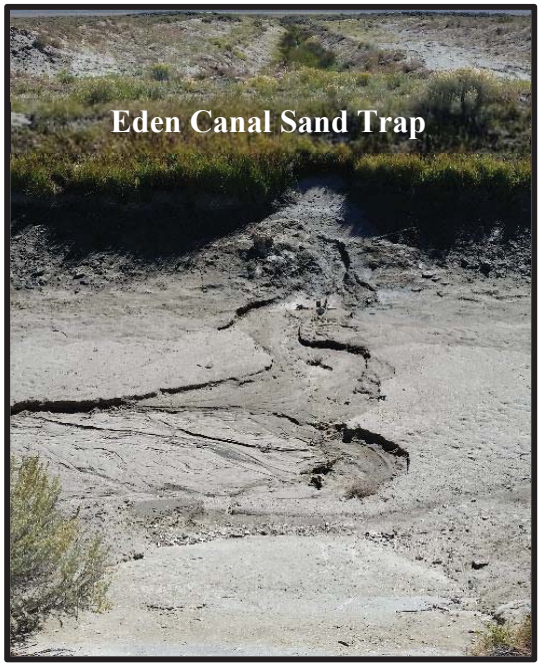
Project Funding Request: Funding Group I $300,000; Total Project Cost $630,000

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 and District) Sand Trap Replacement and Eden Canal Lining Project will use funds to conserve 1,554 acre-feet of water per year with the replacement of EVIDD's failing sand trap and by lining 1,100 feet of open canal.

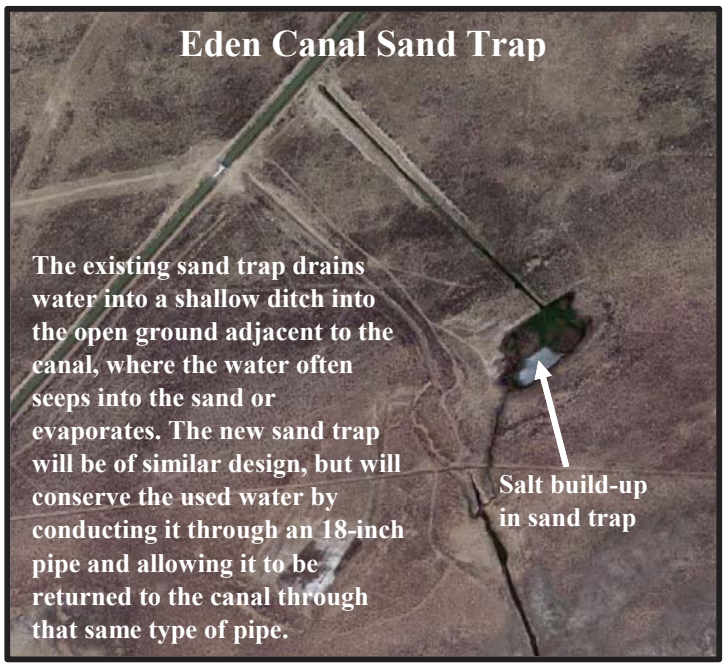


EVIDD receives much of its water from a direct diversion form the Big Sandy River. This may give you a hint to why a sand trap is an essential element of the District's irrigation system. The sand trap is designed to intercept sand moving along the canal bottom and remove it from the flow. Back when the original sand trap was designed, it worked and was efficient. However, after 60 years, it no longer works. Large amounts of water is being lost at end of the sand trap. This project will remove the sand and return the water that used to seep into the ground and cause water tables to rise and irrigation-induced wetlands to form on local farmer's property, to the distribution system. The new sand trap will be of a similar design with some important updates that will conserve water and reduce maintenance. It will be constructed in approximately the same location.

The second aspect of this project is the installation of 1,100 feet of PVC liner, with a 5-inch shotcrete covering. This will provide water conservation to the project and will continue the process the district has started of lining their 60-year-old canal system.

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

- **Conserve 1,554 acre-feet of water per year:** Both aspects of the proposed project will conserve and use water more efficiently by reducing seepage losses caused by a failing sand trap and a deteriorating clay liner.
- **Reduce future water conflict:** Through redesigning and reconstructing the existing sand trap, the proposed project will help mitigate conflict risk of future water conflict. The water at the end of the sand trap used to flow to farmers through a ditch for their use. But when the system was piped a few year back, the ditch was abandoned. However, the water from the sand trap *still* travels through the abandoned ditch and seeps 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 lands.
- **Reliability of water:** 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 the new sand trap. This will eliminate a constant flow of nearly 1 cfs currently percolating into the salty ground adjacent to the Eden Canal (see photo to the right), and reduce the amount of salt and selenium in the Colorado River Drainage Basin.



Length of Time and Estimated Completion Date

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

The contract process is anticipated to be from September to December 2018. The environmental reports and final design will take an estimated six to nine months to complete with advertising, bidding and contract award in July – August 2019. Construction is anticipated to begin in October 2019 and go through April 2020, 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 the entire two-year allowance; October 2018 – September 2020.

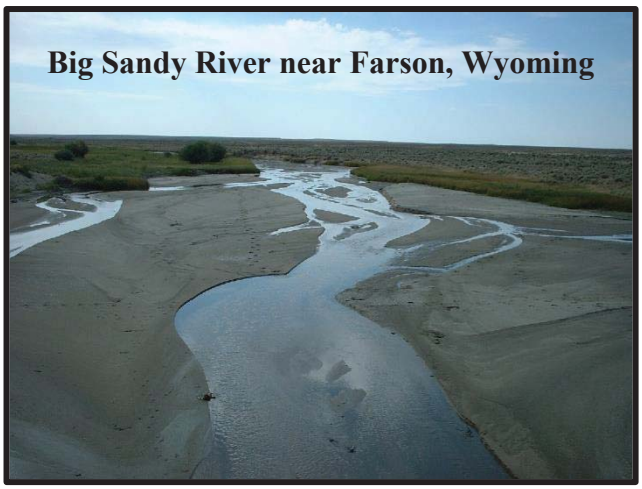
Federal Facility

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.

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 Bureau of Reclamation (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

Source of water supply and water rights involved.

Source of Water: There are two major reservoirs that supply the District. 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 the District 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 the 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. The majority of the sprinkled acres are with center pivots; 25 percent are being 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.

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. However, the sand trap and failing canal liner contribute to the shortfalls even more during drought and low snowfall winters.

The sand trap has contributed to water losses and has been a source of frustration for the District and its water users, even on good water years. The sand trap is intended to remove sand from the Eden Canal, but significant water is lost at the end of the sand trap.

Large water losses, due to the fact that much of the canal is unlined, are contributing to the District's shortfalls. The river and reservoir associated with the EVIDD system are named "Big Sandy." That name is in reference to the soils that are present in the EVIDD service area. The sandy soils are highly pervious and water quickly percolates into these soils. The original Reclamation design called for a clay liner to be installed in the Eden Canal. That liner has almost completely deteriorated in the 60 years since it was constructed, causing seepage losses into the underlying sandy 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; and 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.

EVIDD's water delivery system consists of the Means, Eden and Feeder Canals. 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. The total length of the system canal is 17 miles. There are approximately 92 miles of irrigation laterals. 38 miles are currently piped and 54 miles remain as open channels. An existing sand trap drains water into a shallow flat ditch into the 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.

Energy Efficiency

If the application includes hydropower or energy efficiency elements, describe existing energy sources and current energy uses.

The proposed project does not include hydropower or other energy efficiency elements.

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 was to pay back $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 Bureau 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 Reclamation's Salinity Reduction Program. Reclamation funding for these projects totals nearly $11,000,000.

Project Location

Provide specific information on the proposed project location or project area including a map showing the 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}. For larger project areas, please provide location information in one of the following formats: 1. Shapefile (.shp), 2. KMZ/KML (.kmz or .kml) aka Google Earth File, not an exported GoogleEarth map, 3. AutoCAD (.dwg), 4. PDF map (.pdf)

Geographic Location

The Eden Valley Irrigation and Drainage District (EVIDD) Sand Trap Replacement and Eden Canal Lining 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 1 – Project Location Map, and a map detailing the proposed project area is found in Attachment 2 – Project Detail Map.

Technical Project Description

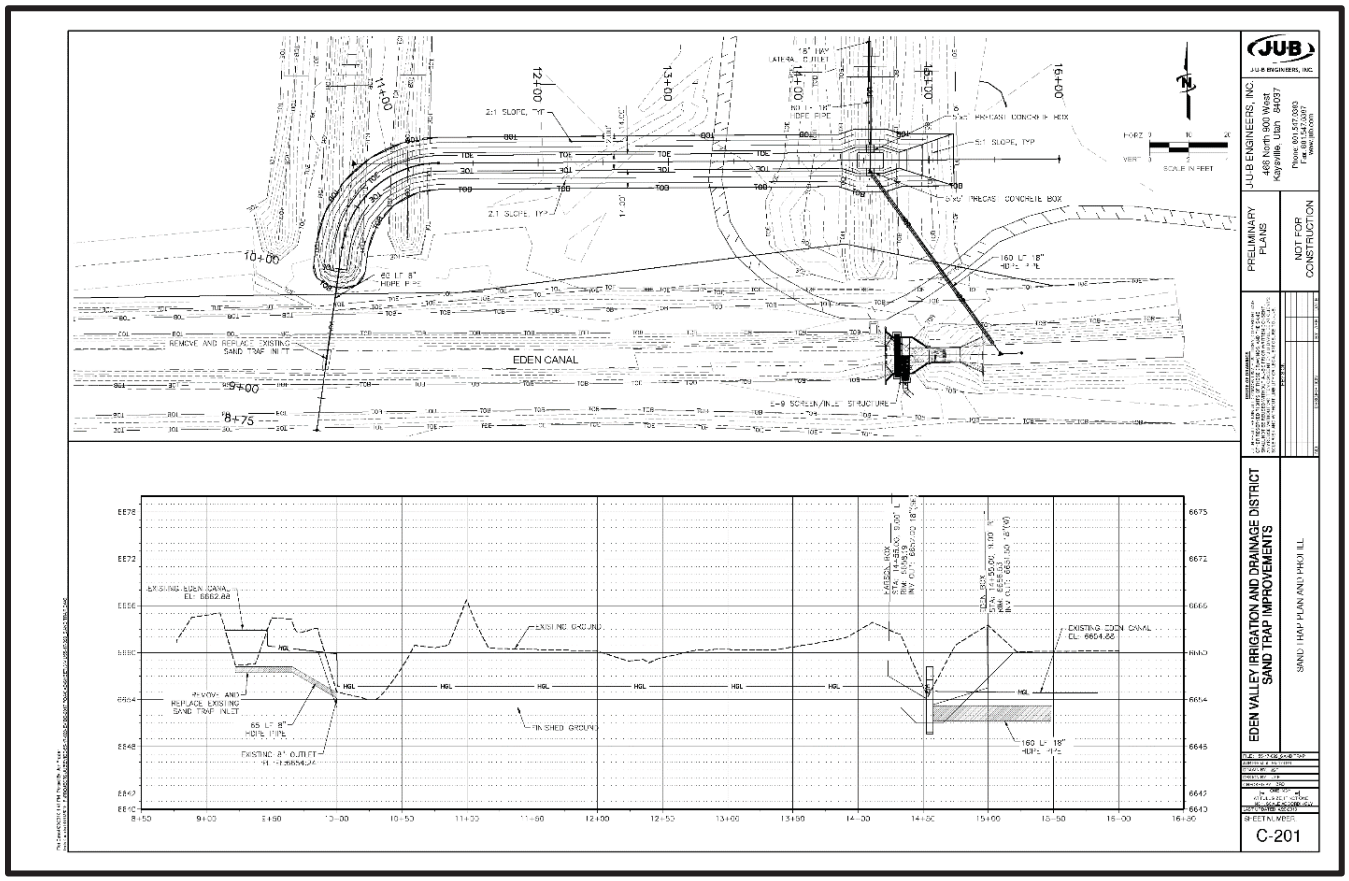
Describe the work in detail, including specific activities that will be accomplished. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

The proposed project consists of a complete replacement of the sand trap. The new sand trap will be lined with concrete and a slot or rectangular opening will be constructed in the bottom of the canal to intercept and remove sand. The sand and the water used to remove the sand will be conducted away from the canal in an 18-inch pipe and into a constructed concrete basin. The water will be returned to the canal through an 18-inch pipe. This pipe for return flow will exit the sand collection basin high up on the wall and above the sand storage. The pipe will return water to the canal below an existing drop structure in the canal. The drop in the canal has an 8-foot drop, which is sufficient elevation change to permit the hydraulics to work. The significant water loss that currently occurs will be reduced to nearly zero loss. The concrete basin will permit the sand removed to be easily cleaned out at the end of the season, rather than requiring monthly cleanings to keep the sand trap functional. Figure 1 below is a concept drawing of the proposed sand trap replacement.

This project also includes lining 1,100 feet of the Eden Canal immediately upstream of the sand trap. This work will include reshaping and lining the Eden canal. When originally constructed,

the section was trapezoidal in shape and was lined with native materials. Over 60 years, the clay liner has deteriorated and the canal cross section has changed. This project will reshape the canal to its original design cross section and line it with 30 MIL EPDM liner with non-woven 10-ounce geotextile fabric on either side. This will be protected by 5 inches of fiber mesh reinforced shotcrete.

Figure 1 Sand Trap Concept Drawing



E.1. Technical Proposal: Evaluation Criteria

E.1.1. Evaluation Criterion A – Quantifiable Water Savings

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 estimated amount of water expected to be conserved as a direct result of this project is 1,554 acre-feet per year. It is assumed that current water losses from canal seepage and water lost through the sand trap will be reduced to zero.

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 water that will be conserved is currently seeping into the underlying sandy soils of deteriorating clay liner; and/or evaporating and seeping into the ground due to an old, defective sand trap design. Water from the sand trap is pooling on local farms, causing the water table to rise, salts to come up on the land, and irrigation-induced wetlands to form.

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

Canal Liner Water Loss: On May 24, 2017, a seepage loss study was performed on the Eden Canal from the Pacific Creek siphon channel to the E-7 Lateral check structure. Flow rates in the canal were measured as well as flows into and out of the canal. Method of flow measurement included the following:

- Ultrasonic Flow Meters – E7 Lateral
- Weir Flow – The E7 Check Structure
- Velocity Meter and Channel Dimensions –Upstream of Pacific Creek Lateral

Water losses were calculated based on mass balance in the reach between each location where in-channel flows were known. Those locations included the upstream channel at the Pacific Creek Siphon and the E-7 Check-Drop Structure. There was only one outflow between these locations. That outflow was for the E7 Lateral, which has an ultrasonic flow meter with constant readout. The results of the water loss study for this reach of the canal can be seen in Table 1 below.

Table 1 Water Loss Results

Location	Outflow (cfs)	Measured (cfs)	Loss (cfs)	Length (ft)	Length (mi)	% Loss	Flow Measurement Method
Pacific Creek Siphon Channel		37.6					Canal Dimensions & Velocity Meter
E-7	15.5						Ultrasonic Flow Meter
E-7 Check Structure		18.9	3.2	10511	2.0	16.9%	Weir

Water loss in the 2-mile section of Eden Canal being measured was 16.6 percent. Table 2 below shows the annual water loss in this section of canal.

Table 2 E-7 Water Loss

Reach			Average Annual Flow (cfs)	Average Annual Vol (AF)	% Water Loss	Annual Water Loss (AF)
From	**To**	**Length (Mile)**				
Pacific Creek	E-7 Check Structure	2.0	86	20469	16.9%	3466

This project will pipe 1,100 feet of this 2-mile reach. This represents 10.5 percent of the reach length. 10.5 percent of 3,466 acre-feet is 364 acre-feet, which is the amount of seepage losses that are assumed to be saved with the canal lining proposed.

Sand Trap Water Loss: Water loss associated with the sand trap is the total flow out of the sand trap over the entire irrigation season. EVIDD staff have estimated the flow out of the sand trap at 5 CFS. At the beginning of the irrigation season, when the canal is first filled, the sand trap completely plugs off because of the fresh flush of debris that has collected in the canal over the winter. Once the water is flowing through the system and EVIDD maintenance staff has time to unplug the sand trap for the season, they measure a 5 CFS drop in the flow below the sand trap. Therefore, the easy assumption is that the sand trap is flowing 5 CFS out of the canal. The irrigation season is approximately 120 days. 5 CFS flowing out of the canal through the sand trap over the 120 days is 1,190 acre-feet.

$$5\ \frac{ft^3}{sec}\ x\ 43{,}560\ \frac{acre}{ft^2}\ x\ 120\ days\ x\ 24\ \frac{hr}{day}\ x\ 60\ \frac{min}{hr}\ x\ 60\frac{sec}{min} = 1{,}190\ acrefeet$$

The total water loss calculated for the project is 1,554 acre-feet.

Total Water Loss

Liner	364	AF
Sand Trap	1190	AF
Total	**1554**	**AF**

Canal Lining

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

The estimated average annual water savings that will result from the lining portion of the proposed project was determined using water losses from the seepage loss study previously described. In this study, flow rates in the canal were measured, as well as flows into and out of the canal. Water losses were calculated for a 2-mile reach of the Eden Canal, based on mass balance in the reach between each location where in-channel flows were known. Based on total water losses for the 2-mile reach, and assuming water savings to be equal to water losses, water savings for lining the proposed section of the canal was calculated at 10.5 percent of the total 3,466 acre-feet of water loss for the 2-mile canal length; equaling 364 acre-feet of water loss, and thereby 364 acre-feet of water savings for the proposed lining portion of the project. The results of the water loss study for the 2-mile reach of the canal can be seen in Table 3 below. Water loss in the 2-mile section of the Eden Canal being measured was 16.6 percent.

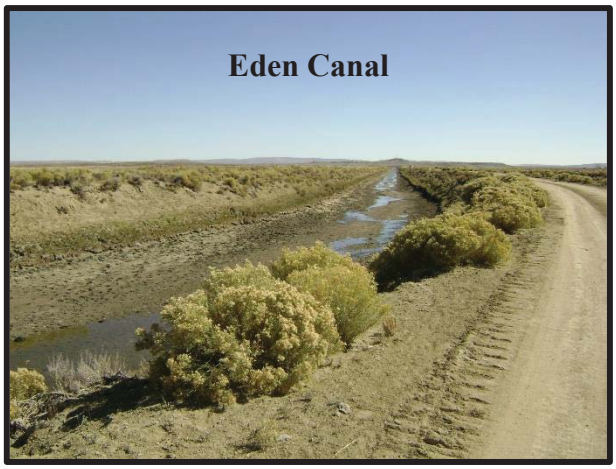


Table 3 Water Loss Study 2-Mile Reach

Location	Outflow (cfs)	Measured (cfs)	Loss (cfs)	Length (ft)	Length (mi)	% Loss	Flow Measurement Method
Pacific Creek Siphon Channel		37.6					Canal Dimensions & Velocity Meter
E-7	15.5						Ultrasonic Flow Meter
E-7 Check Structure		18.9	3.2	10511	2.0	16.9%	Weir

The Table 4 below shows the annual water loss in the E-7 Check Structure 2-mile section of canal.

Table 4 E-7 Water Loss

Reach			Average Annual Flow (cfs)	Average Annual Vol (AF)	% Water Loss	Annual Water Loss (AF)
From	**To**	**Length (Mile)**				
Pacific Creek	E-7 Check Structure	2.0	86	20469	16.9%	3466

The estimated average annual water savings for the sand trap portion of the proposed project was also determined using a water loss calculation, based on the total flow out of the sand trap over the entire irrigation season. The calculation is as follows:

$$5\ \frac{ft^3}{sec}\ x\ 43{,}560\ \frac{acre}{ft^2}\ x\ 120\ days\ x\ 24\ \frac{hr}{day}\ x\ 60\ \frac{min}{hr}\ x\ 60\frac{sec}{min} = 1{,}190\ acrefeet$$

The total water loss calculated for both the liner and sand trap portions of the proposed project is 1,554 acre-feet (364 AF for the liner portion and 1,190 AF for the sand trap portion), and it is assumed that upon completion of the proposed project, water loss will be at zero, therefore saving the entire 1,554 acre-feet lost.

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.*

As previously mentioned, the average annual canal seepage losses for the liner portion of this project were determined by measuring flow rates in the canal as well as flows into and out of the canal. The method of flow measurement included using Ultrasonic Flow Meters – E7 Lateral, Weir Flow – The E7 Check Structure, and Velocity Meter and Channel Dimensions –Upstream of Pacific Creek Lateral. Supporting data/measurements for average annual canal seepage losses are found in the tables provided in the previous question.

The average annual canal seepage losses for the sand trap portion of the proposed project were based on the total flow out of the sand trap over the entire irrigation season. These measurements and supporting calculation are also found in the previous question.

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)?*

As a result of both portions of this project, the expected post-project seepage/leakage losses are expected to be at zero, assuming total water losses to be equal to total water savings, as previously described.

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?*

For the Eden Canal Lining portion of this project, the annual transit losses are 1,741 acre-feet per mile.

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

Eden Canal Lining – The canal seepage reductions will be calculated by the similar methods used in the seepage loss study. Using the dimensions of the canal cross section at the beginning and ending of the newly lined section and a velocity probe, the flow rate at each location can be measured. The difference (if any) will be the new canal seepage losses. This will be subtracted from the losses determined in the 2017 seepage loss study to verify the reduction in seepage losses.

Sand Trap – The flow into the new concrete basin from the sand trap can be measured using a velocity probe, pipe dimensions and flow depth in the pipe. The flow from the basin back into the canal can be measured using the same method. The water loss is the difference between the two measurements. This number will be subtracted from the current 5 CFS sand trap outflow described earlier to verify the reduction in seepage losses.

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

Ethylene Propylene Diene Monomer (EPDM) Rubber Liner – This is rubber liner that provides a water proof layer between the water and underlying soils. It will be protected by a shotcrete (concrete covering). It will be installed in accordance with (1)ASTM D7106-05(2010) Standard Guide for Selection of Test Methods for EPDM Geomembranes and (2) D4637/D4637M-10 Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane.

Geotextile Fabric–Geotextiles will be installed on either side of the EPDM liner and will serve to separate the liner from native soils and concrete to protect the liner. Geotextile will be specified in accordance with NRCS Design Note 24, "Guide for the Use of Geotextiles."

3000 psi Concrete – Concrete will compose the main protective cover over the EPDM liner. The concrete liner protective cover will be "shot" into place. (Shotcrete) It will contain fiberglass fibers as reinforcement. The shotcrete thickness will be 5-inches.

Concrete will be cast in place to provide the liner for the basin receiving the sand and water from the sand trap. This concrete will be reinforced with wire mesh. The concrete will be 5-inches on the floor and 4-inches on the side slopes.

The concrete cement will be Type II Portland Cement Concrete with 3000 psi compressive strength. Concrete specifications will follow customary ACI and ASTM standards.

18-inch High-Density Polyethylene (HDPE) DR 21 PIPE & fittings – This pipe will run to and from the canal and concrete basin. This is a common pipe material frequently used in water conveyance. It will be produced in accordance with ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings.

E.1.2. Evaluation Criterion B – Water Supply Reliability

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:

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

  The project involves support from its local water users. The existing sand trap is causing water to flow down a long, abandoned ditch towards farms; and 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 sand trap replacement and Eden Canal lining.

- *Is there widespread support for the project?*

  Yes, local farmers, shareholders, and others are supportive of this project. EVIDD applied for Salinity funds this past year for this project, and they were not successful. However, Wyoming Water Development Commission was in full support of this project. Within a letter approving this project for funding, WWDC 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 WWDC 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 replacement of a failing sand trap and a deteriorating clay liner that have 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 ground – water that is currently harming the land more than it is helping it by causing the water table to rise, salts to surface, and irrigation-induced wetlands to form. By completing this project, the EVIDD service area will be contributing to the mission of the WWDC to protect and preserve Wyoming's water and land resources. Because EVIDD's goals align with the mission of the Wyoming Water Development Commission, WWDC has agreed to fund 50 percent of the proposed project. A letter confirming this support is found in Attachment 3 – 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 NRCS funds to implement sprinkler irrigation. With how aware current water users have become of their current "water loss" situation, they will be even more motivated to implement future water conservation improvements; anything to conserve and maintain their precious water supply.

- *Will the project make water available to address a specific water reliability concern? Please address:*

  - *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.*

    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 deteriorating clay liner in the proposed portion of the Eden Canal, water is seeping into the underlying soil instead of reaching the farms for which it was intended. Also, because of the failing sand trap adjacent to this canal, water used to remove the sand is spilling over the side and either seeps into the ground

or evaporates. Also, as previously stated, some of this "lost" water is finding its way to the long, abandoned ditches connected to the sand trap and onto farms. This is causing the water table in this area to rise, and creating irrigation-induced wetlands.

- *Describe where the conserved water will go/how it will be used. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)? Will it be left in the river system?*

  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.

- *Describe how the project will address the water reliability concern?*

  The proposed project will address the water reliability concern described above by improving upon and completely replacing a portion (1,100 feet) of the Eden Canal liner and the existing sand trap. This will ensure that water flowing through the canal, and water being used by the sand trap to remove sand is being kept in the canal system and properly delivered to stockholders; rather than seeping into the ground, evaporating, or pooling on farms.

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

  Through redesigning and reconstructing the existing sand trap, and lining 1,100 feet of the Eden Canal, 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 1 cfs, currently percolating into the salty ground adjacent to the Eden Canal, will be eliminated, 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 States, and when farmers cannot get enough water to produce quality crop, or any crop at all, tension will rise.

  One water-related crisis that is being brought up and addressed is local water users being concerned about "lost" water from the sand trap pooling on their farms. This excess water is causing the water table to rise, and if the water table 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.

- *Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.*
  The canal lining will prevent seepage into the underlying soils. The impervious liner will prevent seepage and keep the water in the Eden Canal.

  The concrete basin to be constructed as part of the new sand trap will receive the water and sand from the sand trap. The sand will settle out to the bottom of the concrete basin. The water will return to the canal via a pipe located high in the wall of the basin.

- *Describe the roles of any partners in the process. Please attach any relevant supporting documents.*
  WWDC 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.

  The state of Wyoming is providing 50 percent of the funding for this project through a loan and some grant funds. The funding letter provided by the Wyoming Water Development Office is found in Attachment 3 – EVIDD WWDO Funding Letter. The funding applications are due in September and approved by the Wyoming Legislature in February. Over the past 10 years, WWDC has provided nearly $12M in matching funds to EVIDD projects jointly funded with Reclamation.

- *Indicate the quantity of conserved water that will be used for the intended purpose.*
  1,554 acre-feet will be conserved and put to beneficial use providing irrigation for farms within the EVIDD service area.

- *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 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 the farm income.

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

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

E.1.4. Evaluation Criterion D – Complementing On-Farm Irrigation Improvements

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 sprinkling systems assisted through pumping. These irrigators understand that the benefits of sprinkling outweigh the cost of pumping, and have already made that investment.

    Within the EVIDD service area, many of the existing laterals have already been piped. However, the topography of the service area does not produce enough pressure in these piped laterals to allow sprinkling without pumping. 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 4 – On-farm Intent Signatures.
  - *Applicants should provide letters of intent from farmers/ ranchers in the affected project areas.*
    As stated above, signatures of intent are found in Attachment 4 – On-farm Intent Signatures.
- *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?*

  N/A

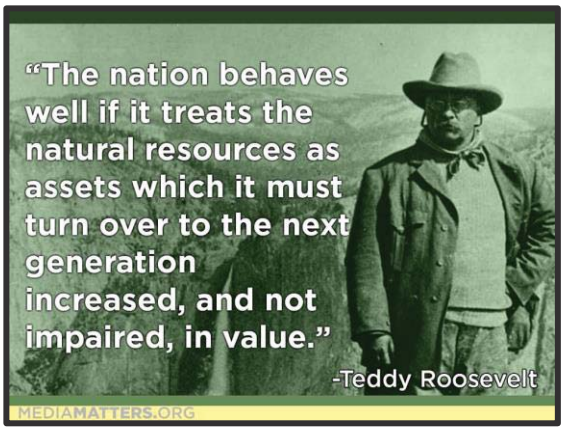
- *Describe the on-farm water conservation or water use efficiency benefits that would result from the on-farm component of this project.*
  - *Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

    N/A

E.1.5. Evaluation Criterion E – Department of the Interior Priorities

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.

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, by identify problems with and maintaining its water distribution system. Because of EVIDD's efforts to improve water reliance in their service area and water quality in surrounding waterbodies, 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 complete replacement of the Eden Liner and sand trap. Both replacements will keep America's valuable water resources from seeping into the ground and/or evaporating because of failing infrastructure, and the sand trap will reduce the amount of salt and selenium in the Colorado River Drainage Basin.

Restoring trust with local communities

Certain reservoirs in the Green River Basin have water storage permitted 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 pool 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 uses.

EVIDD's local community has expressed many concerns regarding water reliability in the area. Most prominent among these concerns is the concern that "lost" water from the existing sand trap is making its way to their farms via a long, abandoned ditch. This excess water is threatening their farms and their livelihood as it causes the water table to rise. 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 restore trust with their local communities; and the proposed project will work toward this by resolving an issue that has the potential to negatively impact the area on a much larger scale.

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 failing sand trap and deteriorating clay liner. Although the new sand trap will be of similar design to the existing sand trap, the infrastructure will be new and its useful life 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

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.

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 prepared a Master Plan – Level 1 Study in October 2017. This plan provides support for the proposed sand trap project. Under Section 5.2, Project Priorities, the replacement of the existing sand trap is listed as priority number one.

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. Scores for the replacement of the sand trap under each of these project priorities are as follows:

Rank	Description	Project Type	Recommendation	Note	EVIDD Preference	Water Use Efficiency	O&M Cost	Fundability	Safety
1	Sand Trap	Modernizatio n	Construct concrete basin. Pipe to/from basin.	Line 1 mile of canal & pipe E-31 Lateral with Sand Trap	1	2	2	1	5

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). For more information calculating performance measure, see Appendix A: Benefit Quantification and Performance Measure Guidance.

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

Eden Canal Lining – The canal seepage reductions will be calculated by the similar methods used in the seepage loss study. Using the dimensions of the canal cross section at the beginning and ending of the newly lined section and a velocity probe, the flow rate at each location can be measured. The difference (if any) will be the new canal seepage losses. This will be subtracted from the losses determined in the 2017 seepage loss study to verify the reduction in seepage losses.

Sand Trap – The flow into the new concrete basin from the sand trap can be measured using a velocity probe, pipe dimensions and flow depth in the pipe. The flow from the basin back into the canal can be measured using the same method. The water loss is the difference between the two measurements. This number will be subtracted from the current 5 CFS sand trap outflow described earlier to verify the reduction in seepage losses.

E.1.7. Evaluation Criterion G – Nexus to Reclamation Project Activities

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

- *Does the applicant receive Reclamation project water?*
  The Big Sandy Reservoir is a Reclamation project. This reservoir is the source of water for EVIDD via the 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 Bureau of Reclamation.

- *Is the project in the same basin as a Reclamation project or activity?*
  Yes, as stated above, the proposed project involves the EVIDD Canal system, which receives its water from the Big Sandy Reservoir; both of which are Reclamation projects.

- *Will the proposed work contribute water to a basin where a Reclamation project is located?*
  Yes, as previously stated, conserved water will reduce the call for water by farmers receiving water from the EVIDD Canal diversion, and therefore the Big Sandy Reservoir. This will help maintain minimum pool 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

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

$$\frac{\$330{,}000.00 \text{ EVIDD Funding}}{\$630{,}000.00 \text{ Total Project Cost}} = 52\%$$

50% of the funding will come from the state of Wyoming. That funding has already been approved by the Wyoming legislature on November 6, 2017.

Percentage of Non-Federal and Federal Funding Sources

FUNDING SOURCES	***% of Total Project Cost***	***Total Cost by Source***
Recipient Funding	52%	$330,000.00
Reclamation Funding	48%	$300,000.00
Other Federal Funding (WWCD)	0%	$0.00
Totals	100%	$630,000.00

Project Budget

Funding Plan and Letters of Commitment

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

How you will make your contribution to the cost-share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).

EVIDD received approval for funding from the Wyoming Water Development Commission (WWDC) for 50 percent of this project. The funding letter provided by the Wyoming Water Development Office is found in Attachment 3 – EVIDD WWDO Funding Letter.

Describe any donations or in-kind costs incurred before the anticipated Project start date that you seek to include as project costs. For each cost, identify:

No in-kind costs have been incurred.

Describe any funding requested or received from other Federal partners. Note: other sources of Federal funding may not be counted towards the required cost share unless otherwise allowed by statute.

WWDC was created to support water projects within the state. Through its Level III New Development and Rehabilitation Program, funding is available. EVIDD received approval for funding from WWDC for 50 percent of this project.

Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.

There are no pending funding requests.

Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	***AMOUNT***
Non Federal Entities	
Recipient Funding/WWDC Loan	$330,000.00
Non-Federal Subtotal	$330,000.00
Other Federal Entities	
Other Federal Subtotal	$0.00
Requested Reclamation Funding	**$300,000.00**
Total Project Funding	**$630,000.00**

Budget Proposal

Budget Item Description	Computation		Quantity Type	Total Cost
	$/Unit	Quantity		
Salaries & Wages	$0.00	-	-	$0.00
Fringe Benefits	$0.00	-	-	$0.00
Travel	$0.00	-	-	$0.00
Equipment	$0.00	-	-	$0.00
Supplies and materials	$0.00	-	-	$0.00
Contractual /Construction				**$628,000.00**
Design	$40,000	1	EA	$42,000
Construction Management	$40,000	1	EA	$42,000
Environmental Review (NEPA)	$18,000	1	EA	$19,000
Mobilization	$30,000	1	LS	$30,000
Furnish and Install Typical Eden Canal Liner (Geotextile and PVC Liner)	$80.00	1,100	LF	$88,000
Furnish and Install 4” Thick Shotcrete for Typical Eden Canal Liner	$170.00	1,100	LF	$187,000
Furnish and Install 18” HDPE DR 21 Pipe	$50.00	400	LF	$20,000
Concrete Basin	$200,000	1	EA	$200,000
Other				**$2,000.00**
Reclamation Review Environmental Report	$2,000	1	EA	$2,000
Total Direct Costs				**$630,000.00**
Indirect Costs				
Type of rate	Percentage	$base		**$0.00**
Total Estimated Project Costs				**$630,000.00**

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 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 Utah 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 and equipment. Generally, the low bidder will be selected based on a determination of acceptable qualifications.

J-U-B Engineers, Inc. has been working with EVIDD for over two years as they helped them prepare their Master Plan – Level 1 Study. They have been contracted to prepare the design and NEPA documents for this project. The contractual for the proposed project will include design, construction management, NEPA, mobilization, furnishing and installing Eden Canal Liner components and HDPE pipe, the concrete basin, and other miscellaneous items listed within the budget.

The Engineering fees have been evaluated to ensure that they are fair and reasonable based on the Bureau of Labor Statistics wage rates for engineers.

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 or so years. It is expected that it will take $19,000 to evaluate the required information, prepare the report, and update any changes required from Reclamation after their review of the proposed project. The total cost is 4 percent of the project, which includes the $2,000 for review by Reclamation.

Other Expenses

The other expense that is expected for EVIDD is the setting aside of $2,000 in funds for Reclamation to review the environmental document.

Indirect Costs

No indirect costs will be part of the proposed project.

Total Costs

EVIDD Portion: $330,000 Fed Portion: $300,000 Total: $630,000

Environmental and Cultural Resources Compliance

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also 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 complete replacement of the existing sand trap. The proposed project improvements will take place entirely within the existing right-of-ways. In the past, similar projects have had minimal impacts. The 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 completely replace the existing sand trap, a rectangular opening in the bottom of the canal in a short and roughly poured section of concrete. The sand trap is part of the original canal design and has been poorly maintained.

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 Support

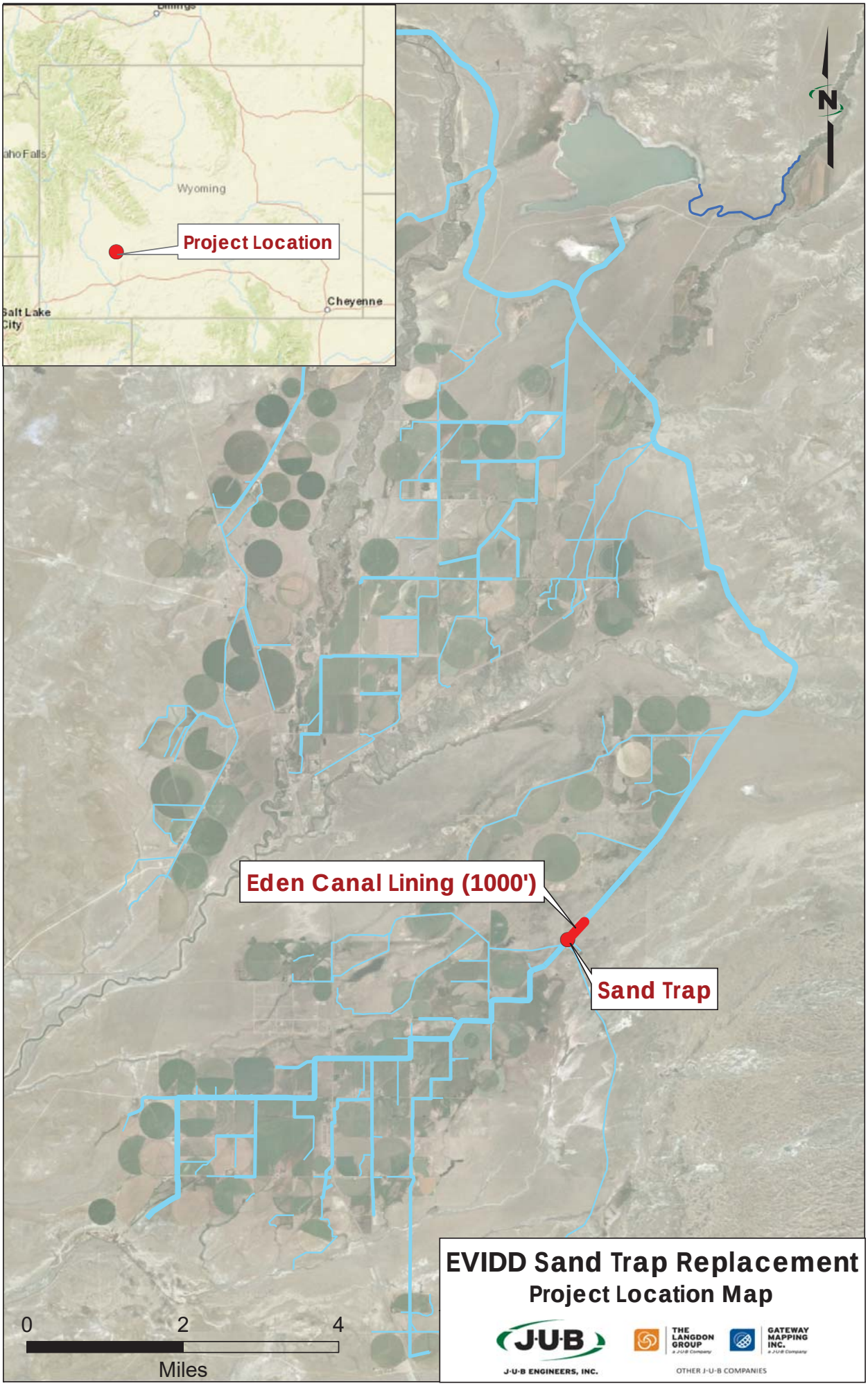
Include letters of support from interested stakeholders supporting the proposed project.

As stated under Funding Plan and Letters of Commitment, EVIDD received approval for funding from the Wyoming Water Development Commission (WWDC) for 50 percent of this project. The funding letter provided by the Wyoming Water Development Office is found in Attachment 3 – 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) Sand Trap Replacement and Eden Canal Lining Project will be submitted within 30 days after the application deadline.



EVIDD Sand Trap Replacement

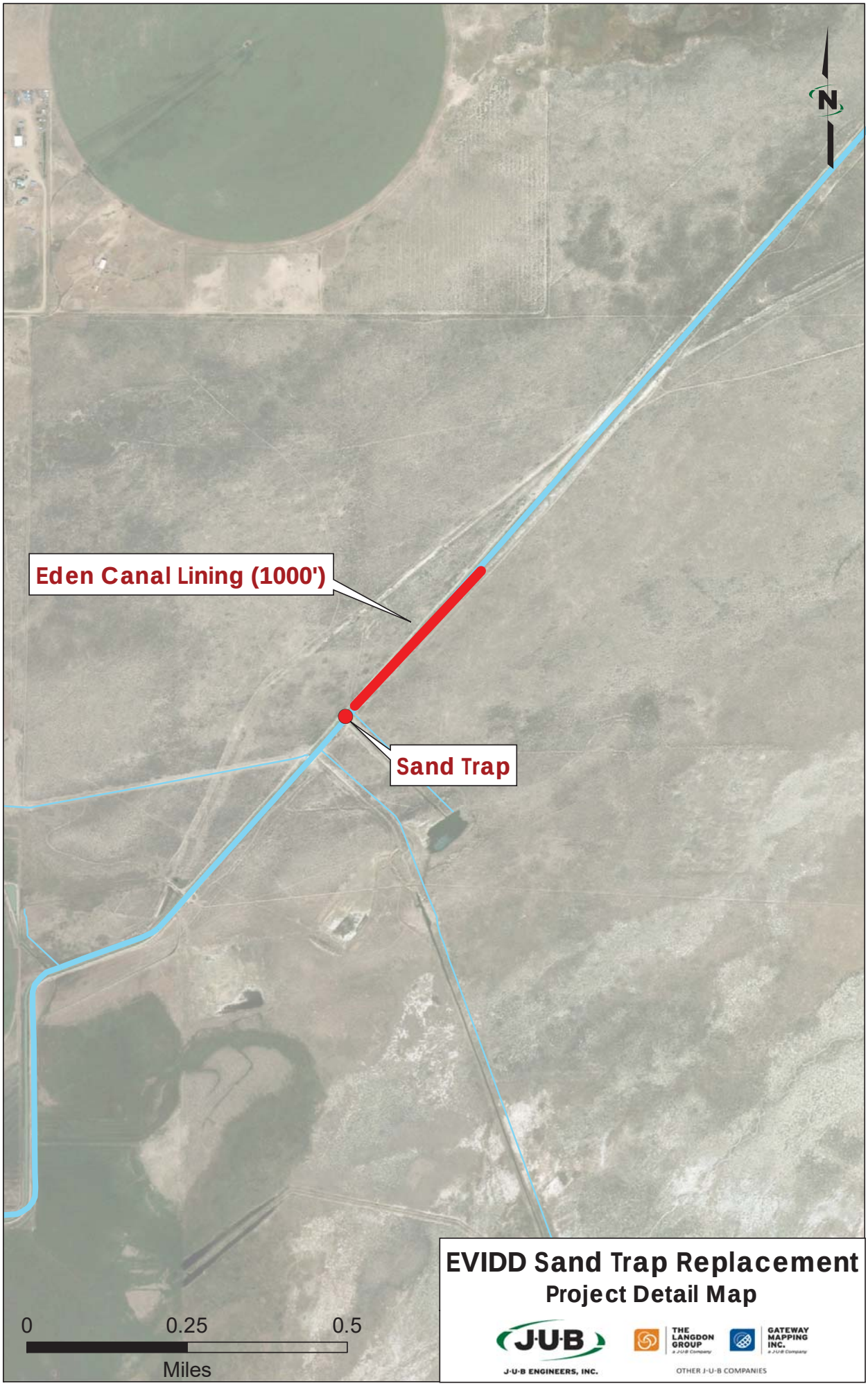
Project Location Map

J-U-B ENGINEERS, INC.

THE LANGDON GROUP

GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES



EVIDD Sand Trap Replacement

Project Detail Map

J-U-B ENGINEERS, INC.

THE LANGDON GROUP

GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

WYOMING WATER DEVELOPMENT OFFICE

6920 Yellowtail Road
Cheyenne, WY 82002

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

November 6, 2017

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 –

The Wyoming Water Development Commission (WWDC) is in receipt of Eden Valley Irrigation and Drainage District's (EVIDD) project applications for the (i) Farson Phase 3, and (ii) Sand Trap, Eden Canal Lining and E-31 piping projects. These projects are the types of projects that WWDC has funded in the past. Additionally, the identified projects have been funded in the past through Reclamation's FOA program and Wyoming's Basin States Program. The Wyoming Water Development Office (WWDO) understands WWDC's funding importance when seeking Reclamation funding for salinity reduction projects. The WWDO and WWDC look forward to assisting EVIDD on these new projects.

Kind Regards,

Harry C. LaBonde Jr.

Harry LaBonde, Jr., P.E.

Eden Valley Irrigation and Drainage District (EVIDD)
On-farm Intent Signatures – Sand Trap Replacement and Eden Canal Lining Project
FOA# BOR-DO-18-F006

Landowner name	**Claimable acreage**	**Landowner signature** I have an interest to install a high-efficiency irrigation system when sufficient water quantity, quality, and application requirements are met.
Chilton Land & Livestock	56.32	
Clayton Cowan	43.84	
Ignacio & Careen K. Goicolea	72.42	
John H. & Launa M. Greer	28.25	
Michael G. & Marcia E. Hensley	1.2	
Justin K. & Nadelle Jones	5.06	
Thomas H. & Kathleen F. Morrison	6.64	
Mosquito Creek Outfitters, Inc.	18.08	
Joseph Pfeiler	14.85	
~~Mark B. Thomas~~ Justin Jones	8.66	
TOTAL ACRES CLAIMED	254.12	