
Leasburg Dam
Rio Grande
25
Las Cruces
California Lateral
10
Mesilla
Modernizing the California Lateral and Extension
Mesilla Dam
Three Saints Main Canal
Revitalizing the Three Saints Main Canal at Wasteway 19
N
Legend
EBID Boundary
Select EBID Canals
0 1.75 3.5 7 Miles
New Mexico
EBID Area
0 65 130 260 Miles

Delivering Conservation:

Renovating Efficient Access to Rio Grande Project Surface Water for the Mesilla Valley

WaterSMART Grants: Water and Energy Efficiencies Grant
FOA No. BOR-DO-21-F001

Elephant Butte Irrigation District
530 South Melendres Street
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1.1. Executive Summary

September 17, 2020
Elephant Butte Irrigation District, Doña Ana and Sierra Counties, New Mexico
Main offices in Las Cruces, New Mexico

Elephant Butte Irrigation District (EBID), located in the Mesilla and Rincon Valleys in southcentral New Mexico, along the Rio Grande, proposes an integrated set of water conservation measures to stretch and maximize the benefit of the limited resources available to EBID. This project is comprised of two components that entail modifying existing canal systems. The first component of the project, Modernizing the California Lateral and Extension, involves piping the California Lateral from Wasteway 13 to 7,580 feet upstream and piping the California Extension from the heading to 5,960 feet downstream. Modernizing the California Lateral and Extension also includes installing three lift pumps at Wasteway 13 that will pump from the Rio Grande through plastic irrigation piping to be discharged farther upstream back into the California Lateral and into an adjoining farmer's ditch. This component will mitigate the classical problem of tail-end deliveries by creating a new delivery point to make direct diversion-to-delivery to the current tail-ender farmers. The second component of this project, Revitalizing the Three Saints Main Canal at Wasteway 19, involves installing three lift pumps at Wasteway 19 that will pump from the Rio Grande through plastic irrigation pipe to be discharged back into the Three Saints Main Canal and into an adjoining farmer's existing piped irrigation system. Both components of this project involve the installation of photovoltaic solar arrays to help offset the electrical requirement and energy nexus required of the pumps. The farms surrounding these projects, owned by Stahmann, Salopek, and McNamee, have agreed to contribute to EBID's cost share of this project. The piping of the California Lateral and California Extension will reduce seepage, improve delivery to constituent farmers, allow bidirectional flow in laterals, and improve on-farm efficiencies. The pumping systems for both components of this project will reduce the conveyance transportation time and conveyance losses required for delivery to these important parts of the Mesilla Valley leaving the water in the Rio Grande rather than through long reaches of unlined earthen canals. These water conservation measures are crucial during these times of ongoing drought in this region of New Mexico and ongoing climate change worldwide.

All portions of the proposed projects are located on EBID property, which is held by EBID by title after transfer from the Bureau of Reclamation with the exception of the construction of the pump box required for Revitalizing the Three Saints Main Canal at Wasteway 19 near the river levee and within the overbank of the Rio Grande which is managed by the IBWC, or on land which EBID will receive ownership to construct, operate, and maintain the improvements which is being contributed to the project by EBID constituent farmers. Letters of support and commitment have been included for the land swap being contributed.

The project will take three years to complete. The project will be constructed outside of EBID's delivery season during the maintenance seasons, November 2021 – March 2022 then

November 2022 – March 2023 and completed November 2023 – March 2024 with design starting as soon as possible.

1.2. Project Location

All components of this project lie within the boundaries of the EBID, which provides surface water irrigation to the Mesilla and Rincon Valleys. This project includes improvements to the California Lateral, California Extension, and Three Saints Main Canal. The California Lateral is a branch of and begins at the Mesilla Lateral and terminates at Wasteway 13. The California Extension is a continuation of the California Lateral, beginning at Wasteway 13 and terminating at the Mesilla Dam Spur Drain. The Three Saints Main Canal is a branch of and begins at the Eastside Main Canal and terminates at Wasteway 23.

Figure 1: Project Overview

More specifically all components of this project are within the Mesilla Valley. The component Modernization of the California Lateral and Extension is located southwest of Las Cruces, New Mexico. More specifically, this component of the project is 0.91 miles southwest of the Town of Mesilla. The component Revitalizing the Three Saints Main Canal at Wasteway 19 is located 1.53 miles south of Vado, New Mexico. The locations of the components of the project can be seen in Figure 1. The coordinates for Modernization of the California Lateral and Extension are 32°15'13" N 106°48'5.65" W (WGS84). The coordinates for Revitalizing the Three Saints Main Canal at Wasteway 19 are 32°5'23.6" N 106°39'30.3" W (WGS84).

1.3. Technical Project Description

1.3.1. Nature of Problem

Open channel irrigation conveyance is one of the key technological developments that led to the rise of human civilization and it has been a key feature of our species for at least 5,000 years. Virtually all of the systems – ancient systems (and modern ones) in Egypt and Mesopotamia, the Warabandi systems of south Asia, and EBID in southern New Mexico – suffer from a common malady: the disparity in water supply between the head of the ditch and the tail of the ditch. This unfortunate feature of shared canal systems is well established and has created stratified cultures, including the oppressive caste system of India and angst among farmers within EBID. The old saying that it is better to be upstream with a shovel than downstream with a water right is sadly true. Despite the well operated system EBID provides, downstream users must deal with the operations of upstream co-constituents, which induce unexpected fluctuations and limitations in the downstream water supply.

EBID is required by statute to allocate water to its constituents pro-rata. Each acre of water-righted land in the district must receive the same allotment of water. However, the delivery of allotted water to land at the tail end of this century-old, dendritic canal system is both inefficient and operationally difficult. Long-distance conveyance of water in canals, particularly unlined ones, is inefficient due to bottlenecks, seepage, and evaporation losses. Any opportunity to move the point of diversion closer to the point of delivery will increase efficiency. Reduction in conveyance distances reduces conveyance losses proportionally which can result in large water savings. The higher flows available near the head of a ditch also allow for much higher on-farm irrigation efficiencies. EBID is therefore proposing to apply modern technology to tackle the oldest problem in canal irrigation systems by bringing the ditch head to the tail.

EBID is a riparian irrigation system, diverting water from the main stem of the Rio Grande at three principal diversion points: Percha Dam, just below the release point of Caballo Dam and irrigating the entire the Rincon Valley; Leasburg Dam, at the head of the Mesilla Valley and irrigating the upper third of the valley; and Mesilla Dam, just south of Las Cruces and irrigating the lower two thirds of the Mesilla Valley.

The downstream end of any system, the southern end in our case, is particularly problematic. The system connected to the Leasburg Dam, beginning with the Leasburg Canal, has very long reaches of lateral sub-systems. The Mesilla Lateral, a branch off the Leasburg system, is long but continues to be a very active delivery system. Deliveries of water to its tail end is exacerbated by the constriction of its conveyance system, much like a blocked coronary artery, by the road culverts and other development that has taken place in the areas surrounding Doña Ana, Las Cruces, and Mesilla during the century since the canal system was built. Bypass surgery is the logical solution.

In 2013, EBID first implemented a proof-of-concept project for this approach, placing water from the head of the Mesilla Dam's Eastside Canal into the tail end of the Leasburg Canal/Mesilla Lateral system. The pump installation on the Eastside Canal is shown below in Figure 2. The tail-enders of the Mesilla branch of the Leasburg system are very close to the heading of the Mesilla Dam diversions. By installing connectivity, by both pumped and gravity flow, between the heading of the Mesilla system and the tail end of the Leasburg system, the tail-enders in the project area of the Leasburg system functionally became head-enders, increasing the equity of EBID's delivery system substantially. Farmers participating in the project received improved flow rates and scheduling reliability. While the allocation and allotment were at record lows in 2013, the conveyance for water to the project area increased from the 45 percent in the canal system to the project average of 65 percent. The savings due to improved efficiency in this project was small compared to the entire district's water use but the improved delivery timing to the directly benefited farms was a major improvement. The water conserved was distributed pro-rata through the allocation/allotment system to all the constituents of EBID.

Figure 2: Lift pump on the Eastside Canal conveying water from the head of the Mesilla Dam diversion to the tail end of the Leasburg system

In 2016, as second proof-of-concept of this approach was implemented when pumps were installed within the Rincon Lateral Wasteway 18 shown in Figure 3. This connection of the tail end of the Rincon system to the river has drastically improved irrigation timing and effectiveness of irrigation deliveries to the last 2,200 acres at the tail Rincon Lateral. Those within the directly benefited area of the Rincon WHEN project, partially funded by the Bureau of Reclamation WaterSMART program beginning in 2014, are now at the head of the ditch and have drastically improved delivery timing. This improvement has rippled throughout the Rincon Valley as expected, allowing for the entire valley to benefit from improved delivery timing on top of the slightly increased per-acre allotment due to the water savings.

Figure 3. Pumps installed at the Rincon Wasteway 18

The efficiency of conveyance to and on-farm irrigation on the historically tail-end land will be dramatically improved with the proposed work. More productive and efficient water use will reduce overall system losses while providing a more reliable water supply for the tail-enders to give them the dependability they need to grow more productive and valuable crops. The reduction in system losses will benefit all constituents of EBID, as the allotment of surface water is calculated by multiplying the diversion allocation by the conveyance efficiency. As the conveyance efficiency increases, the surface water allotted to farmers increases in direct proportion.

1.3.2. Pipeline Project — Modernizing the California Lateral and Extension

7,580 feet of EBID's California Lateral and 5,960 feet of EBID's California Extension will be converted from an open, unlined, earthen channel to an steel corrugated metal pipeline with concrete check and diversion boxes, as well as alfalfa valves for water distribution. There are to be three concrete check boxes and one concrete distribution box installed along the proposed piped California Lateral. Figure 4 shows an example of a canal designed and piped by EBID in 2005. For the stretch of the California Lateral between the old Snow Lateral and the existing Del Rio Drain, depicted in Figure 7, alfalfa valves will be installed, alternating the outlet placement on the north and south sides of the pipeline. There is to be one concrete distribution box installed along the proposed piped California Extension.

Figure 4: The Kerr Lateral, which has been placed in pipe.

Piping the California Extension in 36-inch pipe and the planned portion of the California Lateral in 48-inch pipe will require first excavation of the existing canal to the pipeline grade and sloped as designed by EBID's Engineering Department. Existing EBID equipment including track-hoe excavators and back-hoes will perform the dirt work required to both excavate and backfill the pipeline. Following the pipeline being banded and buckled together by EBID crews, backfill of the pipeline will be accomplished using mostly native material (if approved following lab analysis) compacted to at least 90 percent of modified proctor as tested by outside materials testing labs. EBID has extensive experience installing aluminized steel corrugated metal pipe (CMP) such as will be installed for the California Lateral and California Extension. 5,420 feet of the California Lateral will have 24-inch plastic irrigation pipe, as required for the discharge of the pumps described below, installed parallel to the CMP pipeline with sufficient spacing that adequate compaction can be achieved for both pipelines. An illustration of pipe placement can be seen in Figure 5.

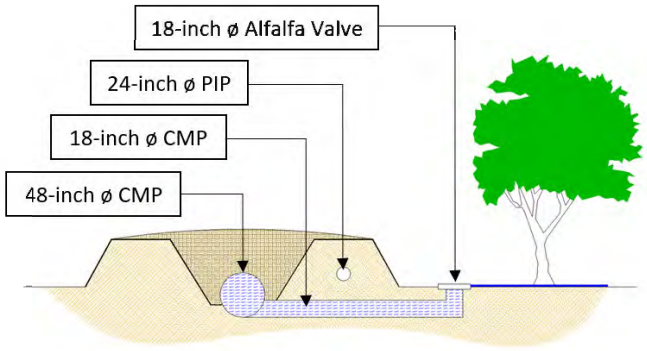

Figure 5: Representation of canal 48-inch transmission pipe installed with 18-inch tee for alfalfa valve and 24-inch plastic irrigation pipe running parallel to 48-inch transmission pipe

To safely pipe the proposed portion of the California Lateral and resolve maintenance issues due the canal's route along and proximity to Snow Road, a notoriously busy local road, a realignment of a segment is required. Figure 9 shows the old and new alignments proposed. This realignment requires a small land swap agreed to by Stahmann Inc. as shown within their letter of commitment in Section 5.

From approximate Sta# 123+73 to Sta# 164+43, the neighboring fields have historically been irrigated by numerous, small turnouts directly from the California Lateral. To make it possible to both serve these numerous diversions from the canal and avoid the need to build concrete distribution boxes at every turnout, 18-inch high-flow alfalfa valves have been specified at roughly 120 foot spacing on both sides of the canal. Each alfalfa valve will be fed with an 18-inch tee from the 48-inch transmission pipe of the California Lateral and will be encased in concrete to prevent erosion as shown in Figure 6.

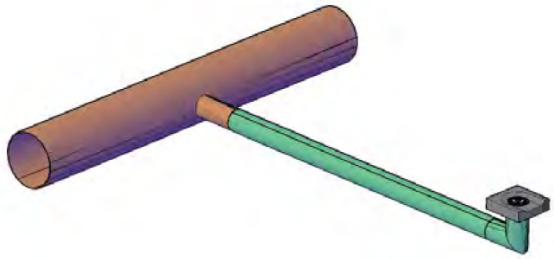

Figure 6: Illustration of alfalfa valve connections to 48-inch transmission pipe with 18-inch tee

The California Lateral and California Extension were strategically targeted because they are located at the tail end of the California branch of the Mesilla Lateral and has great potential for water delivery and efficiency improvements. This canal also serves one of the largest and most active pecan producers of the Mesilla Valley. In fact, Stahmann Inc. in the Mesilla Valley is known to be the second largest pecan orchard in the world.

Figure 7 shows the extents of Modernizing the California Lateral and Extension, including the pipeline, location of component features, and examples of pipeline elements. Figure 8 shows the directly benefited area for Modernizing the California Lateral and Extension.

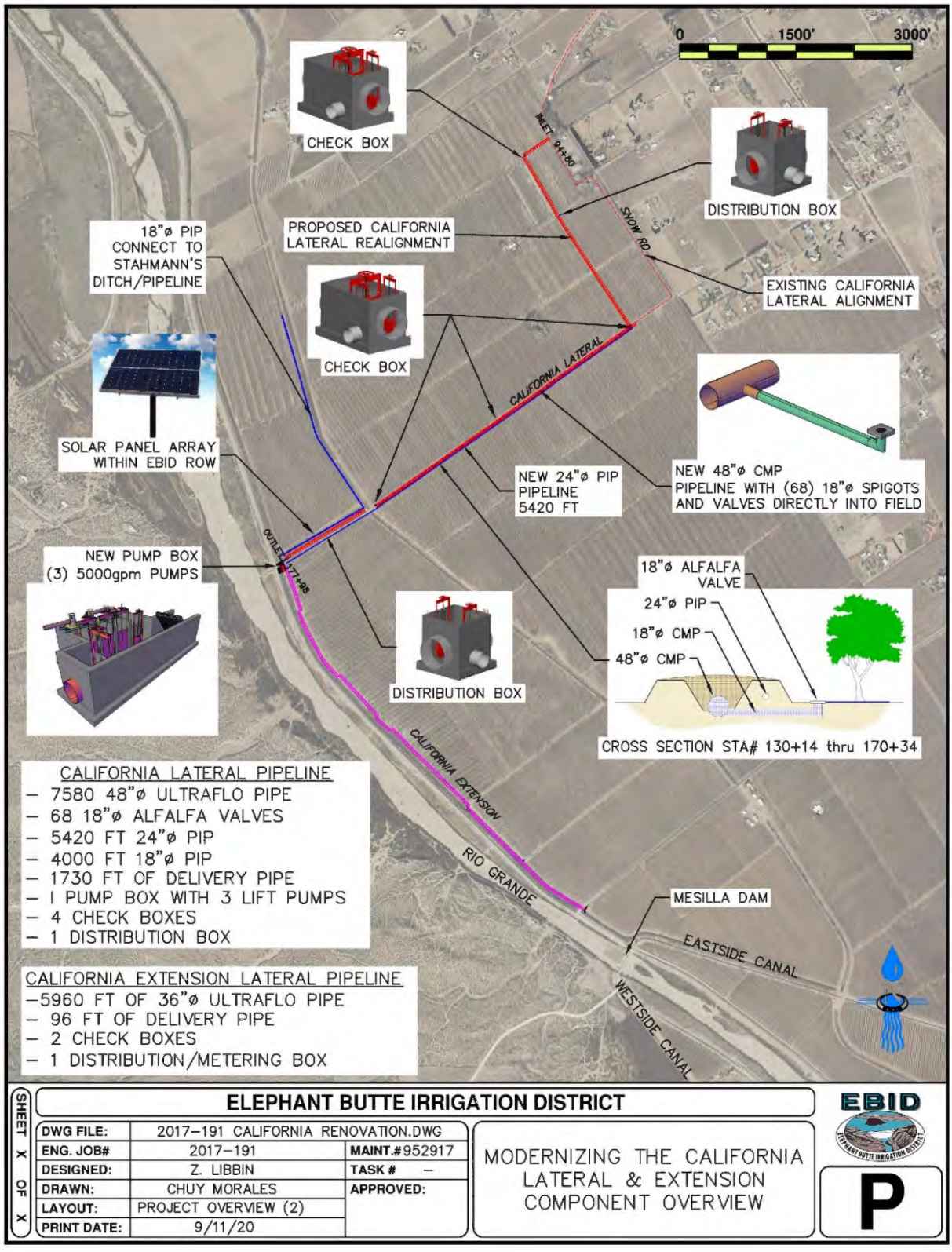

Figure 7: Component Overview – Modernizing the California Lateral and Extension

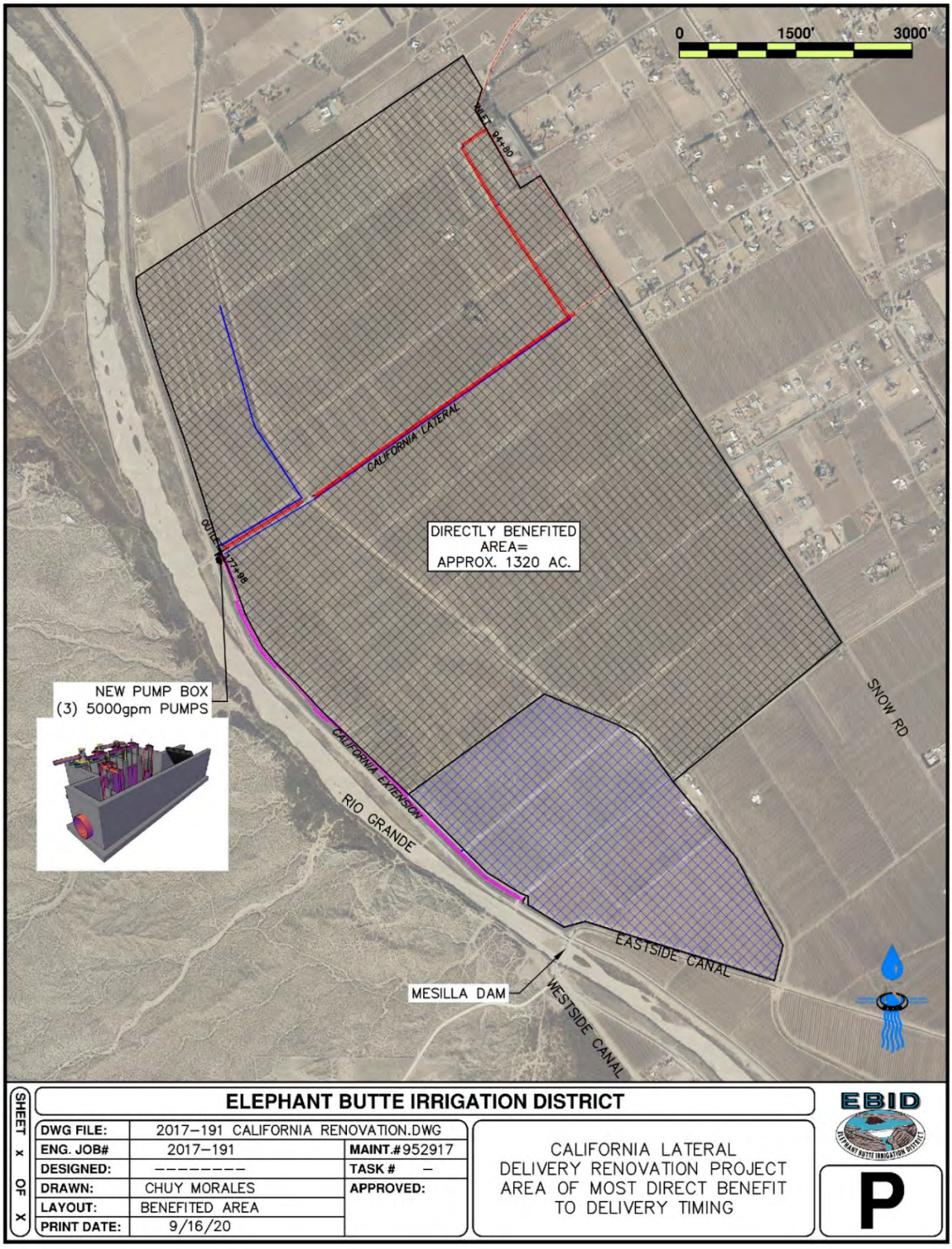

Figure 8. Directly Benefited Area – Modernizing the California Lateral and Extension

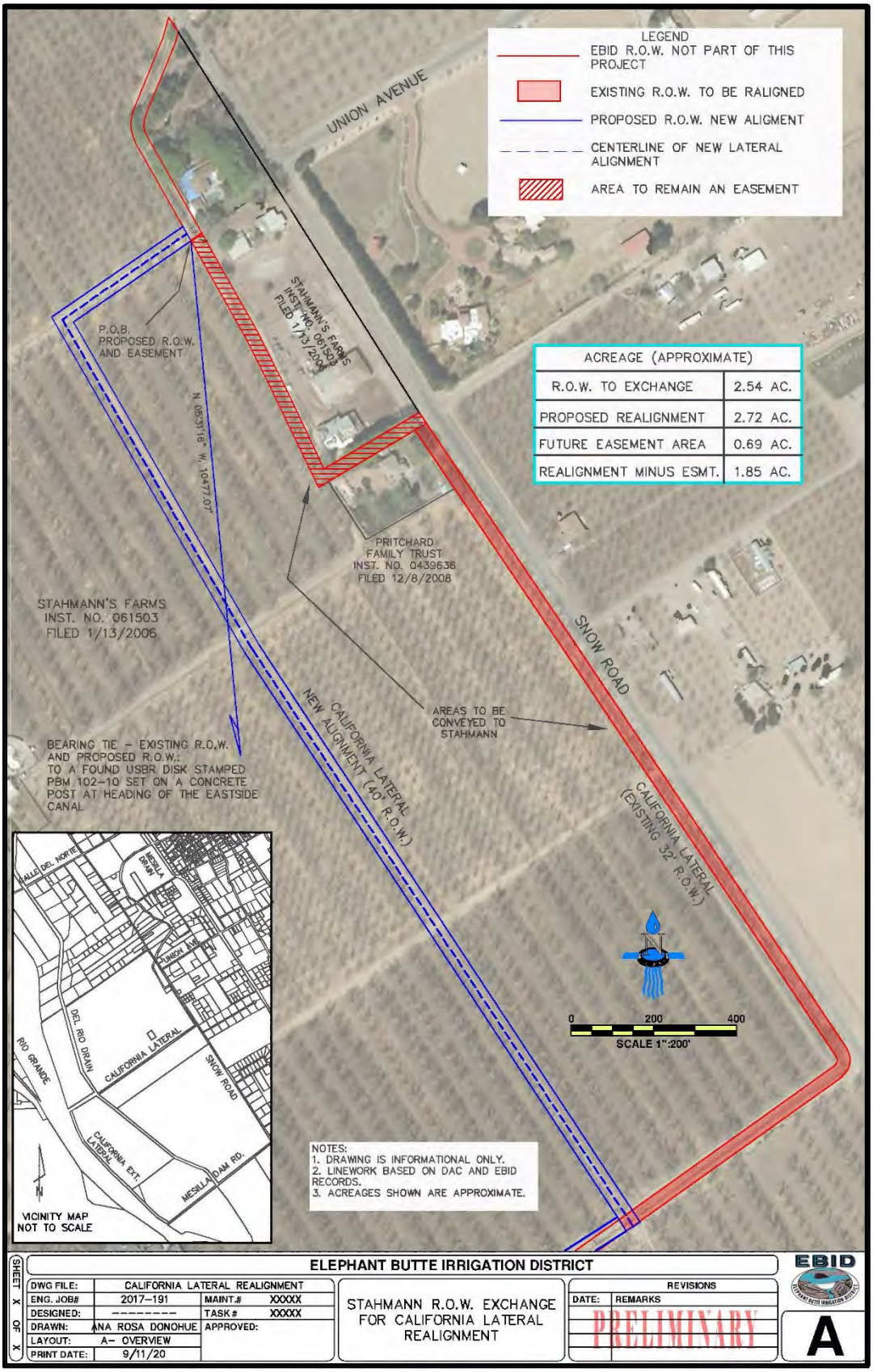

Figure 9: Required Canal Realignment – California Lateral

1.3.3. River Pumps

Both components of this project involve the installation of high-flow, low-lift pumps to deliver water from the Rio Grande back into the canal system to supplement delivery flow rates. For Modernizing the California Lateral and Extension, three 5,000 gpm pumps will be installed at the end of the California Lateral where it becomes Wasteway 13. A concrete pump box is to be constructed within Wasteway 13 on the EBID canal side of the river levee. Two of the pumps will flow into 5,420 feet of 24-inch diameter plastic irrigation pipe, discharging into the check box planned for the turning point of the proposed California Lateral Realignment, depicted in Figure 7. The third pump will discharge through 4,000 feet of 18-inch diameter plastic irrigation pipe, discharging into Stahmann Inc.'s existing ditch (eventually a pressurized pipe system for a network of sprinklers) crossing the Del Rio Drain, depicted in Figure 7. The point of discharge for these pumps is carefully selected to provide flows to the directly benefited area, allowing for these pumps to provide flows greater than or equal to the previously provided deliveries from the Leasburg Main Canal/Mesilla Lateral system.

For Revitalizing the Three Saints Main Canal at Wasteway 19, three 5,000 gpm pumps will be installed at the end of Wasteway 19. Wasteway 19 and the Three Saints Lateral were strategically targeted because they are one of the more optimal locations to provide a more reliable and efficient water supply along the Three Saints Main Canal branch of the Eastside Main Canal. This area mostly consists of pecan orchards which are known for a consistent irrigation schedule and currently struggles with timely water deliveries. Due to its distance from the diversion point and limited capacity due to obstructions upstream it is virtually impossible to deliver to all EBID members in this stretch precisely when they need it for maximizing the irrigation scheduling, thus bypass surgery is needed. A concrete pump box is to be constructed at the outlet of Wasteway 19, on the Rio Grande side of the levee, connecting to the existing concrete levee structure without impacting the levee. Two of the pumps, 10,000 gpm together, will discharge into 1,640 feet of 24-inch diameter plastic irrigation pipe that is to be buried parallel to the existing wasteway, discharging into the Three Saints Main Canal downstream of the Wasteway 19 Check, which is depicted in Figure 10. The third pump will flow into 1,100 feet of 18-inch plastic irrigation pipe that is to be buried parallel to the existing wasteway, discharging into a farmer's existing pipeline, which is depicted in Figure 10. The directly benefited area for Revitalizing the Three Saints Main Canal at Wasteway 19 is depicted in Figure 11. To safely operate and maneuver equipment, Wasteway 19 needs to be cleaned and cleared of existing vegetation and debris.

Supplying power to the pumps of both components of the project will require an upgrade and extension of the El Paso Electric power lines to the site of the pumps. For both components, El Paso Electric has evaluated and deemed the extension of the three phase 230/480V power grid reasonable.

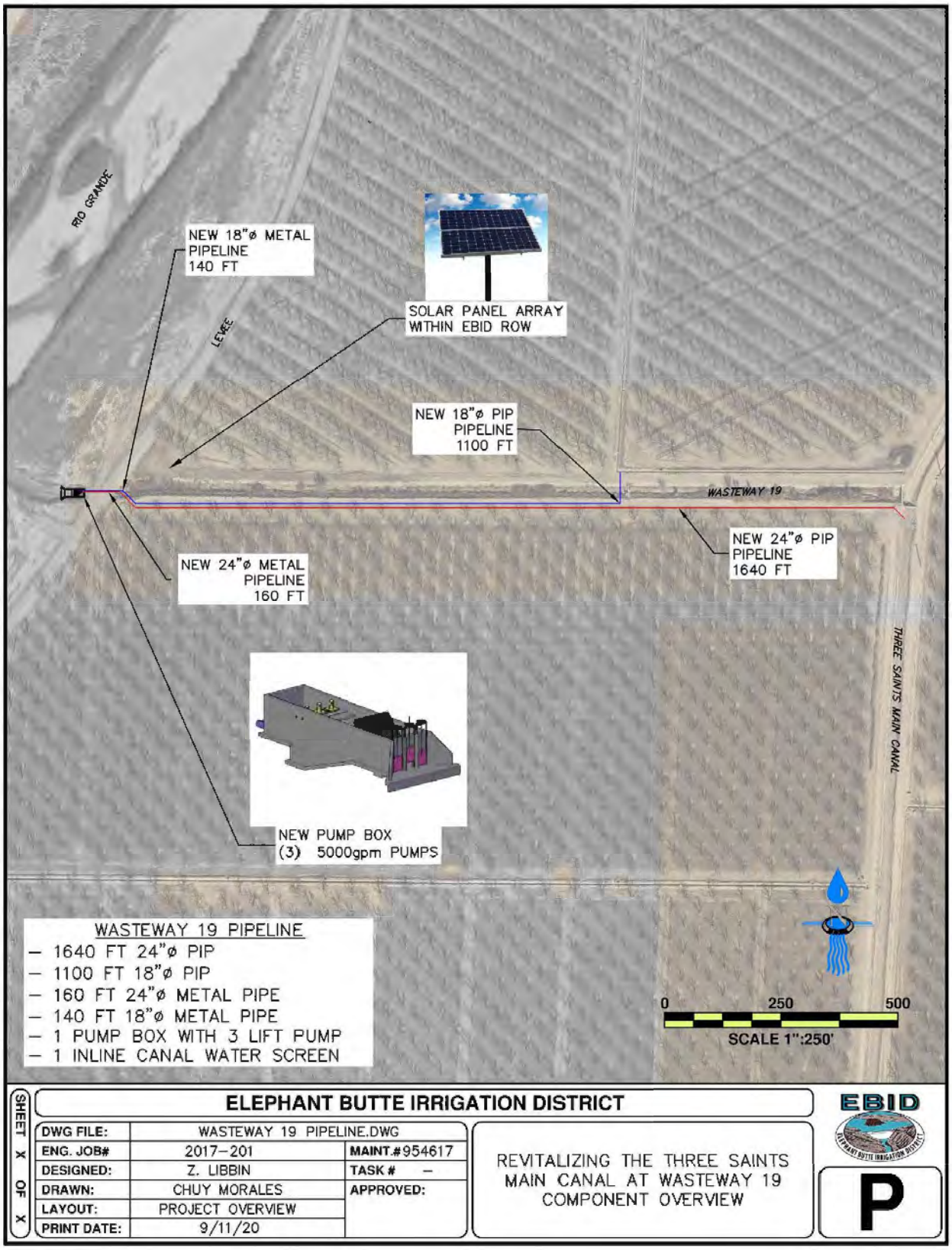

Figure 10: Component Overview – Revitalizing the Three Saints Main Canal at Wasteway 19

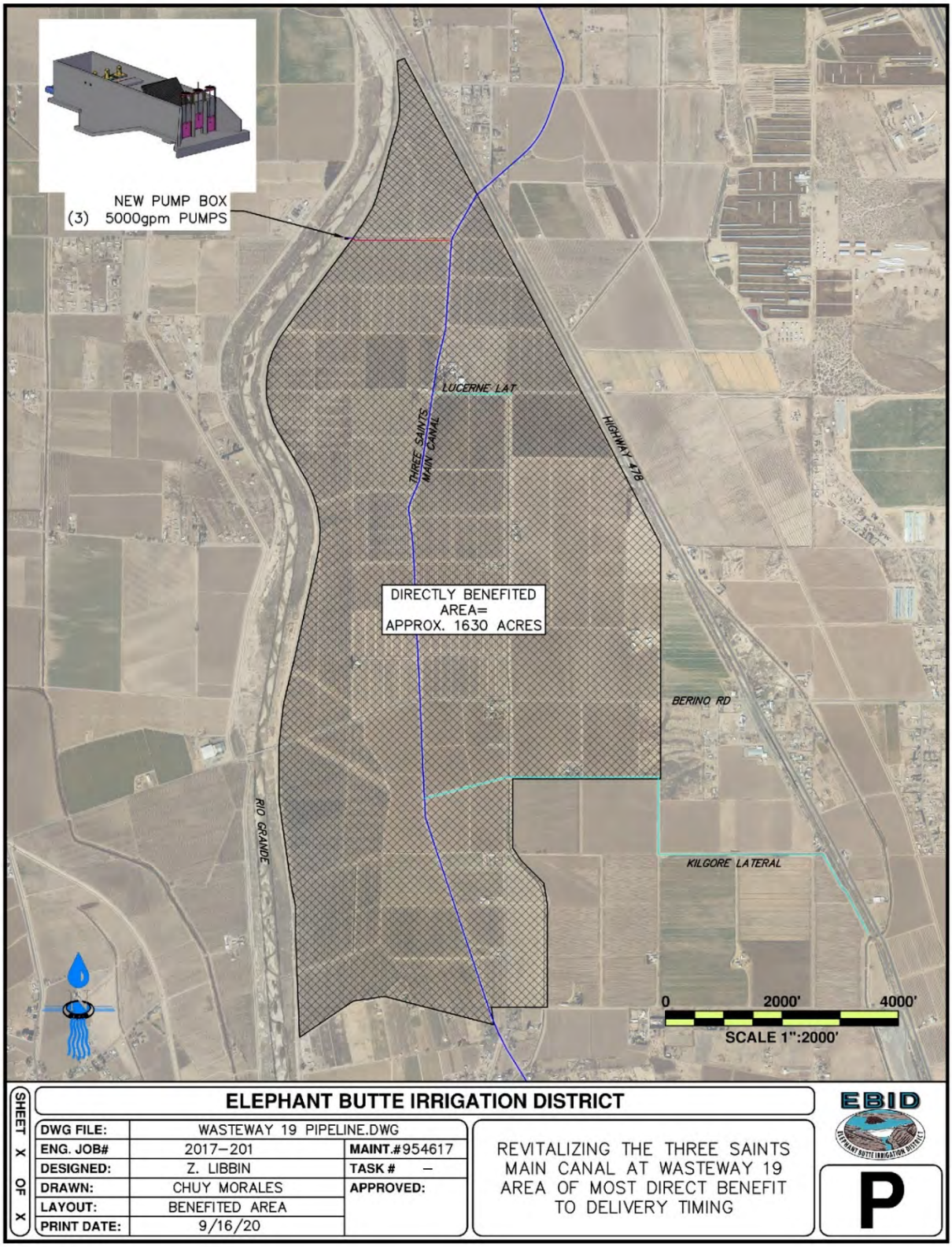

Figure 11: Directly Benefited Area – Revitalizing the Three Saints Main Canal at Wasteway 19

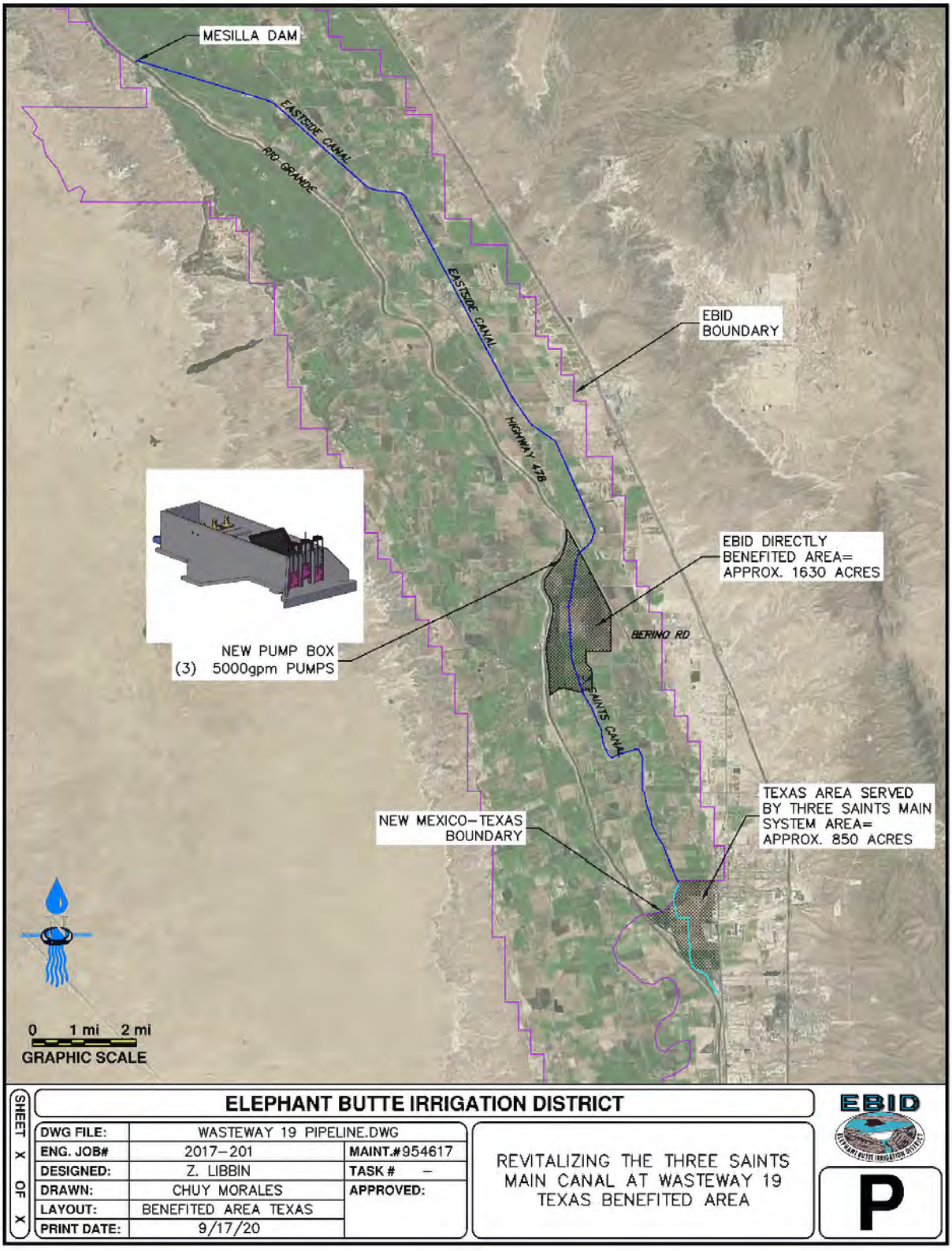

Figure 12: Texas Benefited Area – Revitalizing the Three Saints Main Canal at Wasteway 19

An added benefit of Revitalizing the Three Saints Main Canal at Wasteway 19 is that cooperation with and efficiencies for the El Paso County Water Improvement District #1 (EPCWID) can be improved in times that only EPCWID is diverting and delivering water. Portions of the Eastside and Westside diversion service part of the Texas portion of the Rio Grande Project. In recent years EPCWID will divert 50 cubic feet per second (cfs) in the Eastside Canal at Mesilla Dam to deliver 20 cfs to Texas users of the Three Saints Main Canal and it's laterals further downstream. This situation takes place in recent years when EBID's delivery season is shorter than EPCWID's, for a variety of reasons including the 2008 Operating Agreement, and EPCWID's delivery season starts earlier and ends later in the year than EBID's. This creates a very inefficient situation where EPCWID must divert water and route it 21.4 miles through the Eastside Canal and the Three Saints Main to deliver to roughly 80 water righted acres in Texas. Figure 12 shows the area in Texas which will benefit from Revitalizing the Three Saints Main Canal at Wasteway 19.

1.3.4. *Energy Nexus — Solar Panels*

Since before the creation of the Rio Grande Project, EBID's canal system was and continues to be gravity flow. Adding pumps to improve delivery within EBID's system adds energy costs creating a nexus of energy and conservation. To partially address and offset this nexus, EBID proposes to install photovoltaic panels within available EBID right of way to produce clean, renewable energy to partially offset the electrical demand for lift pumping from the other project components. Approximately 18 kW of solar electric capacity will be installed with both the components of this project.

These solar panel arrays will be connected to El Paso Electric's grid as will the required lift pumps. Following extension of the El Paso Electric grid to supply power to the proposed pumps, an opportunity exists to connect the proposed solar panel arrays to the same location of the grid as the pumps. This will allow for a direct offset of the power required by the pumps. The solar panels will generate electricity for the grid and the lift pumps will take their required energy from the grid, essentially using the grid as a reservoir for electric energy.

EBID will construct six suitable, single-pole style posts with concrete foundations for a group of solar panels to make up the 18-kW array. A licensed solar panel supplier/installer will mount the groups of panels on top of the EBID installed posts with a minimum of 11-foot clearance, similar to the solar panel array that was installed for EBID's Rincon WHEN (FY 2014 WaterSMART grant R14AP00100) project as shown in Figure 13. The solar supplier/installer will wire the solar panels and install the necessary appurtenances to connect the array to the El Paso Electric grid.

Figure 13: Solar panel array installed by EBID and solar installer at Wasteway 18

1.3.5. *Improved Metering — Quantifying the Flows and Deliveries*

Water pumped at each location will be accurately metered. Electromagnetic flow sensor technology connected to an EBID installed Radio Telemetry Unit (RTU) will be installed and incorporated with all of the pumps proposed within EBID's Wasteway 13 and Wasteway 19. The pumping for Modernizing the California Lateral and Extension will be accounted as part of the diversion for the Leasburg Main Canal system and the pumping for Revitalizing the Three Saints Main Canal at Wasteway 19 will be accounted as part of the diversion for the Eastside Main Canal.

Additionally, installation of Doppler flow measurement technology within the pipeline connected to an EBID installed RTU will allow for real time quantification of flows and improved verification of delivered volumes. This technology will be included within the canal pipelines for Modernizing the California Lateral and Extension specifically at three locations along the California Lateral and two locations along the California Extension. EBID has experience with a variety of doppler in-channel/in-pipe sensors which measure velocity and depth to determine flow and total volume passing the measurement point and will be ideal for improving accuracy and precision of accounting for flow and deliveries within these laterals. Collection of real time data will both allow for short- and long-term analysis of water savings due to the approaches proposed.

EBID's Supervisory Control and Data Acquisition (SCADA) Department crews will install the flow measurement and RTUs such that they are connected to EBID's radio network for data collection. The planned placement for installed metering can be found in Figure 14.

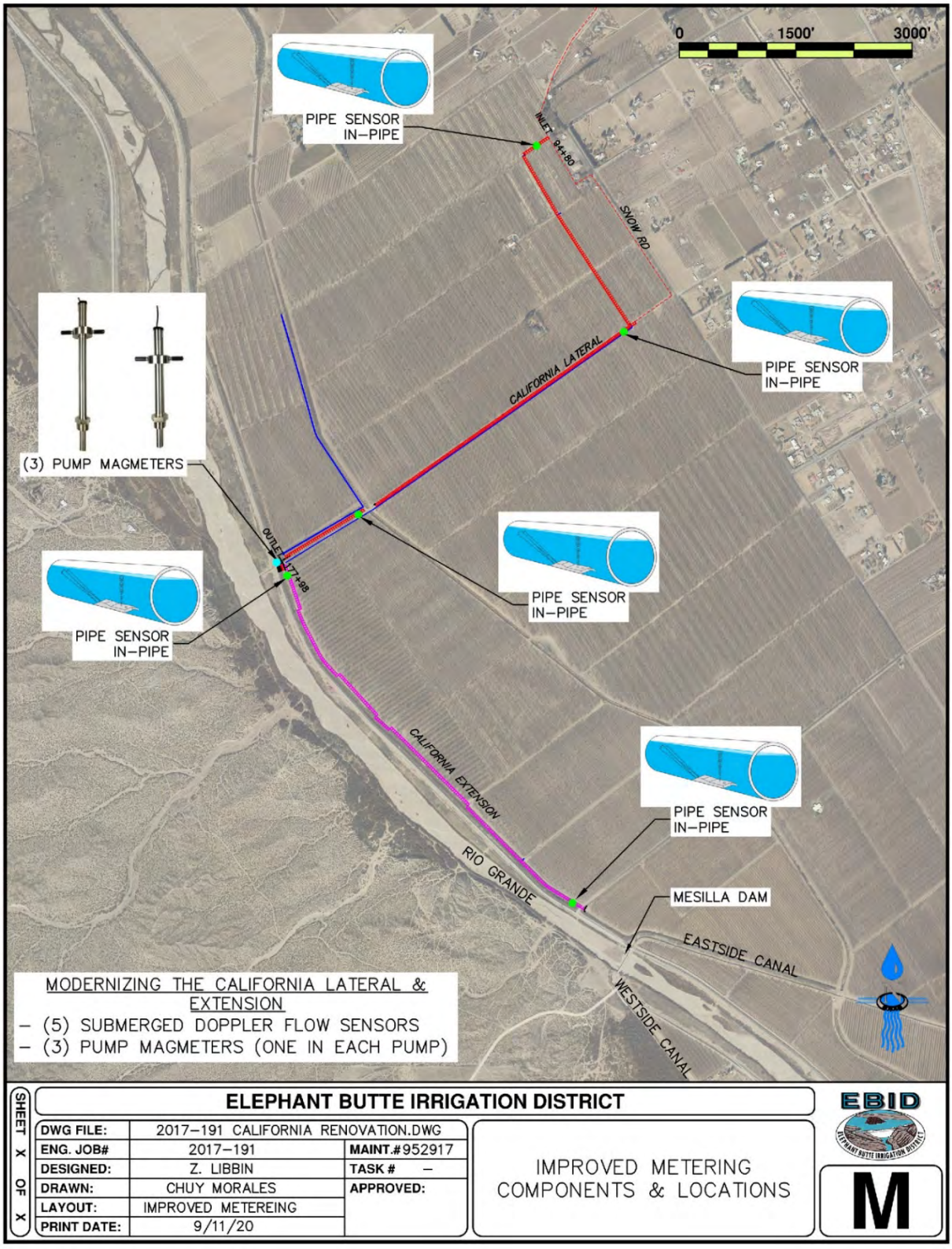

Figure 14: New Metering Components – Modernizing the California Lateral and Extension

1.4. Evaluation Criteria

1.4.1. Evaluation Criterion A — 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 proposed work will conserve a substantial and quantifiable amount of District water. Due to the ongoing drought, the hydrology of water conservation becomes complicated. The primary impetuses for the proposed project are a conservation of EBID's limited water supply and improvements to on-farm efficiencies due to improved timing and improved delivery flow and hydraulic head. Methodology and seepage rates were determined from seepage tests as part of an New Mexico State University student's well done Masters thesis (Al-Haddad, 2005).

The annual allotment to EBID farmers for the past fifteen years (2006-2020) is 1.33 feet. This 15 year average annual allotment shared pro-rata over 90,640 water-righted acres, the basis of allotment in EBID, amounts to a 15 year average volume of about 120,350 acre-feet.

EBID estimates a reduction of canal seepage losses due to the piping of the California Lateral and California Extension of 987 acre-feet per year. The benefited area of the Modernizing the California Lateral and Extension component of this project are 22.44 miles from the diversion of the Leasburg Canal at Leasburg Dam. The majority of flows required by the directly benefited area of the California Lateral and California Extension will be served by the new pumps of Modernizing the California Lateral and Extension, therefore the estimated reduction in conveyance loss for the flows required to serve these critical areas is 3,696 acre-feet per year. The water conserved by these benefits of the project will be shared pro-rata/evenly allotted to all EBID constituents. Significant and quantifiable on-farm conservation is expected due to the improvements of this project. An increase in the average irrigation efficiency from roughly 55 percent, as determined by local field studies of New Mexico State University's course AEN 478: Irrigation and Drainage Engineering, to roughly 70 percent is expected for the 1,320 acres directly benefited by Modernizing the California Lateral and Extension due to improved delivery scheduling and flows. This is estimated to provide 1,800 acre-feet per year of on-farm conservation due to this work and other on-farm improvements that are made possible by these enhancements.

The Revitalizing the Three Saints Main Canal at Wasteway 19 component of the project directly benefits roughly 1,600 acres and with an estimated increase in irrigation efficiency due to improved scheduling from 55 percent to 60 percent. This is expected to result in 848 acre-feet per year of on-farm conservation. The reduction of diversion required to provide 15,000 gpm from the Eastside Canal diversion at Mesilla Dam, which is 14.2 miles upstream, is roughly a third of the amount normally conveyed to the directly benefited portion of the Three Saints Main Canal for this project. This diversion reduction is expected to reduce the conveyance losses by 1,728 acre-feet per year. The sum of these expected measures is 9,059 acre-feet conserved per year. That makes for approximately 7.5 percent of EBID's 15-year average allotment conserved each year. With a total project cost of roughly $3,600,000, this makes for a cost of estimated conserving water of $397.37 per acre foot per year.

Describe current losses: Please 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 lost between release from reservoir storage and crop consumptive use goes to:

- Evaporation from the water surface in the Rio Grande, EBID canals, and incidental on-farm losses (lost to the atmosphere);
- Canal seepage, the largest loss term, which returns to the shallow alluvial groundwater system where it is collected in the drain system and returned to the Rio Grande, pumped out of the ground by irrigators, municipal/industrial water providers, or domestic wells, lost to evapotranspiration in the Rio Grande riparian corridor, or stored in the alluvial aquifer for future use;
- Deep percolation during on-farm irrigation, which also flows to the groundwater system;
- There is minimal tail water as EBID farmers almost exclusively use closed basins.

The water conserved by this project will be shared pro-rata/evenly allotted to all EBID constituents, the same as any system efficiency improvements and conservation measures, who can then either a) use it on their crops and reduce the amount of groundwater pumping necessary to maintain production or increase crop yield, quality, and revenue if they do not have adequate access to groundwater; b) lease the water to another farmer or to future municipal and industrial water providers for use in surface water treatment plants; or c) opt into an emerging environmental restoration option developing with the Water Transactions Program with the IBWC that would allow for marketing or donating water to environmental restoration efforts on an annual basis.

There is little benefit to EBID to lose water to seepage through its canal system. Water lost to the shallow alluvial groundwater system equates to a reduced volume delivered to EBID's members. A decrease in delivery to EBID's members equates almost 1:1 to required pumping of the same groundwater system to satisfy the field delivery requirement of a crop. Thus, the trade-off is energy required to pump the water that is lost to groundwater through canal seepage. Put another way, reduced seepage and canal system losses equates to a pro-rata increase in surface water supply which, in turn, reduces pumping because of state level adjudication settlement specific to the Lower Rio Grande administrative basin known as Stream System 101. This settlement caps the combined use of surface water and groundwater.

Describe the support/documentation of estimated water savings: Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations.
EBID has significant experience evaluating the performance of piped canals. In the last fifteen years, EBID has placed approximately 32 miles of canals in pipe. When EBID's initial piping projects began, a Masters candidate in Civil Engineering at New Mexico State University researched and wrote his thesis on the water savings from reduced canal seepage (Al-Haddad, 2005) due to piping by EBID. Al-Haddad performed ponded seepage tests before and after installation of pipe. One important conclusion he reached is that piping saves, on average, 385 acre-feet of water per mile of piped canal. He also developed a model for estimating seepage

from a canal to be piped based on Vedernikov's method. EBID has since used Al-Haddad's model to estimate the savings from reduced canal seepage with plans to develop additional methodologies for estimating reduction in seepage in the near future. Calculations estimating quantifiable water savings including sufficient detail and all supporting calculations are shown below in Sections 1.4.1.1 and 1.4.1.2 and Table 1, Table 2, Table 3, and Table 4.

EBID's SCADA Department constantly meters and records canal flows, both with real-time measurements and with instream measurement techniques. EBID's ditch riders measure and determine delivery volumes, then record these within EBID's computer system. Combining these two sets of measurement records has proven reliable and staff uses these measurements daily, monthly, and annually to evaluate losses and canal delivery efficiencies. Losses based on measured inflows and deliveries for unimproved and piped canals will be analyzed and summarized for comparison with Al-Haddad's findings.

1.4.1.1. Canal Lining/Piping

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.

Based on the research at New Mexico State University published by Al-Haddad in 2005, it is calculated that piping 7,580 feet of the tail end of the California Lateral and 5,960 feet of the heading of the California Extension will result in a reduction of seepage associated with EBID surface water deliveries of 987 acre-feet per year, as discussed in the beginning of Section 1.4.1 above. This translates into an equivalent increase in water supply for all water-righted acres within EBID.

The three water savings components for Modernizing the California Lateral and Extension – canal seepage, on-farm deep percolation, and conveyance from the piping component – are analyzed based on best available information. Calculation sources are included in the right-hand column of Table 1, with the variables/letters in the formulas referring to the letters on the left-hand side.

Var	Lateral Seepage Reduction		Source
A	13,540	Feet	Project Plan
B	2.56	Miles	A/5,280
C	385	AF/mile/year	Haddad, 2005
D	987	AF Seepage Reduction/year	B*C
	Main On-farm Deep Percolation Reduction		Source
E	1,320	Water Righted Acres	Project Plan
F	3.5	ft/year Consumptive Irrig. Req't	Est. SS 101
G	4,620	AF/year Consumptive Irrig. Req't	E*F
H	55%	Irrigation Efficiency	Typical AEN 478
J	8,400	Farm Delivery Req't	G/H
K	70%	Improved Irrigation Efficiency	Planned
L	6,600	Farm Delivery Requirement	G/K
M	1,800	AF FDR Reduction/year	J - L
	Conveyance Loss Reduction		Source
N	40%	Main Loss	Wilson, 2003
O	3,696	AF Main Loss Reduction/year	N*(1+N)*L

The technical report published by the New Mexico Office of the State Engineer, written by Wilson in 2000, was used to calculate a reduction in seepage from pumping Rio Grande water into the Three Saints Main Canal. While this component of the project does not involve canal piping, there is still water savings to be had from on-farm deep percolation reduction due to higher delivery rates and seepage reduction due to shortened conveyance from tail-to-head. For Revitalizing of the Three Saints Main Canal at Wasteway 19, it was calculated that pumping into the Three Saints Main Canal will result in an average annual water savings of 1,728 acre-feet per year. Calculation sources are included in the right-hand columns of Table 2 with the variables/letters in the formulas referring to the letters on the left-hand side.

Var	Main On-farm Deep Percolation Reduction		Source
P	1,600	Water Righted Acres	Project Plan
Q	3.5	ft/year Consumptive Irrig. Req't	Est. SS 101
R	5,600	AF/year Consumptive Irrig. Req't	P*Q
S	55%	Irrigation Efficiency	Typical AEN 478
T	10,182	Farm Delivery Req't	R/S
U	60%	Improved Irrigation Efficiency	Planned
V	9,333	Farm Delivery Requirement	R/U
W	848	AF FDR Reduction/year	T-V
	Conveyance Loss Reduction		Source
X	1/3	Reduction of Conveyance from Heading	Planned
Y	40%	Main Loss	Wilson, 2003
Z	1,728	AF Main Loss Reduction/year	Y*(1+Y)*V*X

The estimate for the combined conservation of the two components of this project, shown in Table 3**Error! Reference source not found.**, indicate that 9,059 acre-feet per year can be conserved. These savings total 7.53 percent of the average allotment of the past 15 years. Based on the estimated total project cost of $3,600,000 the cost of conserving water is roughly $397 per acre-foot per year, below the marginal value of water for most crops in EBID.

Var	Total Water Conserved		Source
AA	9,059	Total Water Conserved/year	D+M+O+W+Z
AB	$4,000,000	Project Cost	Budget
AC	$441.53	AF Conserved/year	AA/AB
AD	1.33	15-year Avg. Allotment, in ft	EBID records
AE	120,350	Avg. Allotment, in AF	AD*90,640ac
AF	7.53%	% of Avg. Allotment Conserved	AA/AE

How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow test been conducted to determine seepage rates under varying conditions?

As stated above in Section 1.4.1, average annual canal seepage losses have been estimated using the model generated by Al-Haddad's Masters thesis. Part of his research for this thesis involved conducting ponded seepage tests before and after pipe installation, contributing to the creation of his model (Al-Haddad, 2005).

Also stated above in Section 1.4.1, EBID's SCADA Department's records were used to assess losses based on measured inflows and deliveries for unimproved and piped canals. The results, summarized in Table 4, are consistent with Al-Haddad's finding. The measured conveyance efficiency in the canals averaged 58 percent in unimproved canals compared to 92 percent for piped canals.

Table 1: Conveyance Loss Evaluation for Unimproved and Piped EBID Laterals during the 2012 Water Season

Pipeline Laterals	Measured Inflow, AF	Charges, AF	No. Deliveries	Avg Charge (in)	Efficiency
Palmer Lateral	297	307	29	3.55	103%
Kerr Lateral	274	255	35	4.91	93%
Vega Lateral	406	364	34	5.87	90%
Jimenez Lateral	301	259	10	6.95	86%
S-1 Lateral	89	76	10	6.74	85%
Pipeline Totals	1,367	1,261	118	5.06	92%
Unimproved Laterals					
Kilgore Lateral	1,165	822	24	6.08	71%
American Bend Lateral (+Hare, Arrington)	1,179	775	113	4.67	66%
Dona Ana Lateral	1,834	912	285	5.03	50%
Brazito Lateral	431	212	52	4.07	49%
Anthony Lateral	390	163	17	6.29	42%
Open Channel Totals	4,999	2,884	491	5.15	58%

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)?

For the 13,540 feet of canal to be piped as part of the Modernizing the California Lateral and Extension component of the proposed project, post-project seepage/leakage losses are expected to be almost eliminated. EBID has had great success using aluminized steel corrugated metal pipe (CMP) pipe supplied by Contech Engineering Solutions (Contech) with sock gaskets and joint connections known as 5C Single Segment bands (5C). These 5C bands hold at least two full corrugations of each joint of pipe which makes for a quality connection. Contech has provided EBID findings of lab testing concluding that Ultra Flo pipe with 5C bands can create a watertight seal, when installed properly, capable of maintaining 10 psi for 10 minutes without visible leaks, using similar procedure to ASTM D3212 Watertight test for HDPE. Figure 15 below shows Contech's procedure for testing the capability of its Ultra Flo pipe with a 5C band.

Figure 15: Photo of Contech testing of Ultra Flo pipe with 5C bands

EBID's experience with Contech's Ultra Flo pipe with 5C bands has shown no leakage when the bands are installed properly. EBID's experience, combined with Contech's research, documents that leakage losses can be estimated as eliminated or negligible.

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?

A study conducted by the New Mexico Office of the State Engineer in 1999 reported that an estimated "40% of the total surface water withdrawals for irrigation" was lost due to transit within the canals and laterals (Wilson, 2003). These losses can be due to seepage in the unlined canals, degrading components of the delivery/diversion systems, and/or over vegetation within the conveyance canals. This same study reported that the piping of canals can have more than 95 percent conveyance efficiencies (Wilson, 2003). This indicates that for Modernizing the California Lateral and Extension, the section of these canals that are to be piped will go from losing 40 percent of the conveyed water to losing 5 percent or less, meaning that the conveyance, or transit, losses are virtually eliminated.

The pumping systems planned for Modernizing the California Lateral and Extension and Revitalizing the Three Saints Main Canal at Wasteway 19 will also contribute to lowering the 40 percent transit losses for water deliveries in these areas. Any time the pumps are utilized for water delivery the 40 percent conveyance losses associated with the volume pumped are eliminated for the mileage of canals that would have been required for the water to travel from the respective diversion dam to the discharge point for a pump. For Modernizing the California Lateral and Extension, since the pumps will be discharging directly into the pipeline and directly to the farmer, the 40 percent conveyance loss for the acre-footage of water delivered by pump is virtually eliminated.

For Revitalizing the Three Saints Main Canal, conveyance loss is not all eliminated but is reduced significantly. The Three Saints Main Canal is responsible for delivering roughly 90 cfs of water to constituent farmers. The proposed pumping system will provide 15,000 gpm which equates to roughly 30 cfs. The pump system that is planned to be installed will not be able to provide the full 90 cfs of water, but rather a third of the delivery requirement at 30 cfs. This means that a third of the water delivered to this area will bypass traveling about 22 miles of unlined, earthen canals from Mesilla Dam to the pumps' discharge points and therefore will not incur 40 percent conveyance losses. The water deliveries' conveyance losses for the Three Saints Main Canal at the diversion point for Wasteway 19 will be reduced by about 13 percent since that is a third of the original 40 percent. For Revitalizing the Three Saints Main Canal, the conveyance losses will be reduced to about 27 percent of total surface water deliveries when the pumps are in use at full capacity.

How will actual canal loss seepage reductions be verified?

Actual water savings will be quantified and verified following completion of the project by comparing post-project water measurements of inflow to outflow. At least three tests during the irrigation season following completion of the project will be performed to compare to pre-project data and estimates while considering other factors which may have caused changes. EBID's SCADA Department data of inflows, outflows, and deliveries utilizing this project's improved metering will determine actual canal seepage loss reductions. Some of the realized delivery improvements will also be verified using the collected data, farm order history, and delivery timing compared to orders placed. These delivery improvements will be studied in comparison to past order history and available information to analyze changes.

Include a detailed description of the materials being used.

Major components and materials required for the project include:

Corrugated metal pipe

EBID has utilized aluminized steel corrugated metal pipe, known as Ultra Flo pipe, with a low coefficient of roughness (Manning's "n" = 0.012) supplied by Contech Engineered Solutions (Contech) with sock gaskets and joint connections known as 5C bands. The smooth interior of this CMP provides a higher hydraulic capacity than traditional CMP while the exterior box ribs provide structural strength. EBID has utilized Contech's Ultra Flo pipe for almost all of the 32 miles of pipeline EBID has installed to date.

Concrete check and distribution boxes

EBID has experience designing and constructing check structures and distribution structures as part of each pipeline previously constructed. As in a traditional canal, check structures regulate the flow and hydraulic head of the canal allowing for adequate pressure to deliver flows to the members of EBID. Check boxes also include circular slide gates (turnouts) attached to a section of pipe that delivers water to a farmer's ditch. Distribution boxes allow for a turnout to be placed in the pipeline upstream of a check that provides pressure for the turnout. Both check and distribution boxes consist of a reinforced concrete foundation cast in place on a compacted subgrade, formed reinforced concrete walls, and circular sliding gates. A box structure is

finished off with an expanded metal or bar grating to allow for walking on top of the box and to prevent anyone from falling in. For this project, check boxes will incorporate a circular sliding gate centered within the weir wall of a diameter that matches the diameter of the pipeline. The weir wall and height of the box above the weir wall allows for adequate capacity such that the design capacity of the canal can pass over the weir even if the gate is closed, without spilling out of the box. A 3D rendition of an example check box design and a photograph of an example constructed check box are included in Figure 16 below. Box structures can be configured in a variety of ways, as illustrated by the box shown in Figure 16, in which four turnouts come from the check box upstream of the weir and check gate. Figure 16 also shows the check box being utilized for distributing a famer's groundwater outside of EBID's surface water irrigation season. This is similar to the surface water discharge into the California Lateral planned as part of the pumps from Wasteway 13.

Figure 16: 3D rendition and photograph of a concrete check box

Lift pumps

Six high-flow, low-lift pumps are required to lift water from EBID's Wasteway 13 and Wasteway 19 which are connected to the Rio Grande. The pumps will be electric motor driven specified to deliver 5,000 gpm each. The pumps will include above grade discharge assembly, vertical turbine pump assembly, outdoor rated electric motor, basket strainer, and all other parts necessary to make a complete operational lift pump when installed. The selected supplier will provide assembled pumps including installation and startup troubleshooting. Electrical supply components will be provided separately and will include a variable frequency drive for each pump to be able to adjust the speed and therefore the discharge of each pump when needed.

Concrete pump structures

Concrete support and sump structures will be required for both pump installations proposed by this project. The structure will provide adequate submergence to meet the net positive suction head required for pumps supplied and allow for the discharge of the pumps to be routed where needed. Both structures will be relatively complicated structures of reinforced concrete formed and placed by EBID crews. Both pump installation locations will still serve as functional

wasteways. The pump box required at Wasteway 19 will include walls as tall as the river levee and relocation of river flood gates to the end of the structure to maintain the flood protection of the river levee. Figure 17 below shows a 3D rendition (with one wall) of a potential design for the structure required at Wasteway 19.

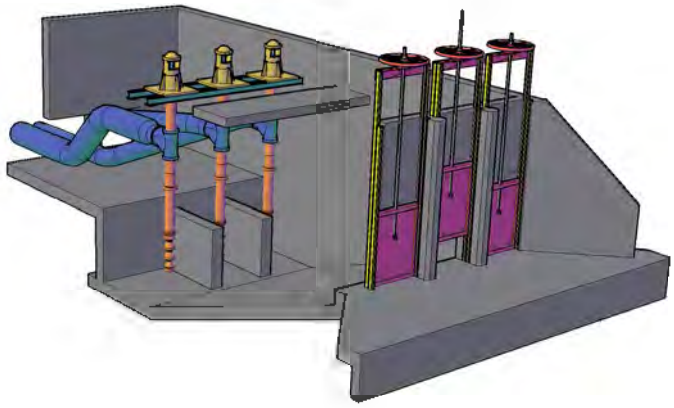

Figure 17: 3D rendition of an example design for a concrete pump structure

Turnout and check circular slide gates

EBID has standardized the outlet gates across the District to Fresno Valve Model 101C Slide Gates. By standardizing the gates installed across the District fewer parts are required to be kept on hand for repairs and reliable performance, specifically seal and operability, can be expected. These gates are also used within the check and distribution boxes of pipelines.

Alfalfa Valves

A portion of the California Lateral, which is to be piped, has traditionally delivered directly to the farmers field rather than into a farm ditch. Because numerous distribution boxes would be required to accommodate all of these turnouts, an alternative solution has been devised utilizing 18-inch tees in the 48-inch pipeline with 18-inch alfalfa valves to be used to regulate flows and seal the outlet when not in use. Various manufacturers provide alfalfa valves which meet project specifications, but two examples of manufacturers are Waterman and Fresno Valve. The arrangement of these valves as planned are shown in Figure 5 and Figure 6.

Plastic Irrigation Pipe

Plastic Irrigation Pipe (PIP) is required to discharge the flows from the proposed lift pumps to their respective outlets. The PIP specified is gasketed bell and spigot PVC SDR51 pipe in 18-inch and 24-inch diameters manufactured in accordance with ASTMD2241. The pipe specified is categorized as 80 psi pipe (SDR 51) which has greater than a 4:1 factor of safety based on the pressures required for the project while also providing adequate durability for the surface water application.

Solar arrays

A photovoltaic (solar panel) array, totaling 18 kW nominal output, will be connected to the power grid. The supplied photovoltaic system shall be split evenly among six single-pole mounts

with six to twelve solar modules each. Racks for mounting sets of solar panel modules will be fixed (non-tracking) pole mounts with tilt angle capable of optimizing for summer output. EBID will design and construct/install the bases and poles for support of the solar panel racks. A contractor will install racks, sets of modules, and wiring atop the poles installed by EBID. Figure 18 below shows an example pole and foundation design for mounting sets of solar panel modules. Figure 13 shows a photograph of a previous array installed by EBID which is being duplicated to help offset the energy required by pumps proposed by this project.

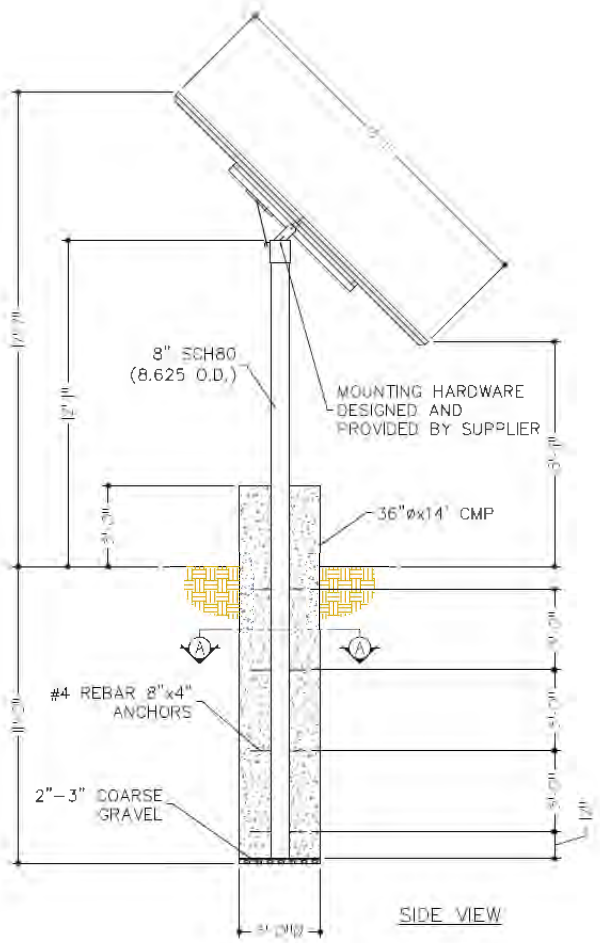

Figure 18: Sample pole design for mounting sets of solar panel modules.

Ultrasonic doppler open channel velocity and depth measurement devices

Doppler current meters designed to measure water velocity, water level, and calculate flow will be installed within the pipeline of the Modernizing the California Lateral and Extension portion of the project. Two examples of this kind of in-channel flow meter are SonTek-IQ and Greyline Ultrasonic flow meters. Both product lines provide the technologically advantaged complex/expensive current profilers in easy to use packages. Accuracy greater than one percent of measured velocity is expected from either supplier. These example sensors both measure velocity and level within the known channel (circular pipe) to calculate flow. These

flow meters will be connected to EBID installed radio/remote telemetry units (RTU) to transmit the data to EBID's SCADA network.

Magmeter flow measurement devices

Electromagnetic flow meters, also commonly known as magmeters, will be installed to measure the output of each of the lift pumps installed. These meters are required to provide highly accurate volumetric flow measurement. These flow meters will be connected to EBID installed RTU to transmit the data to EBID's SCADA network and available on EBID's website.

1.4.1.2. Irrigation Flow Measurement

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

EBID has significant experience evaluating the performance of piped canals. In the last fifteen years, EBID has placed roughly 32 miles of canals in pipe. When EBID's initial piping projects began, a Masters candidate in Civil Engineering at New Mexico State University researched and wrote his thesis on the water savings from reduced canal seepage (Al-Haddad, 2005). As described previously in Section 1.4.1.1, Al-Haddad performed ponded seepage tests before and after installation of pipe. One important conclusion he reached is that piping saves, on average, 385 acre-feet of water per mile of piped canal. He also developed a model for estimating seepage from a canal to be piped based on Vedernikov's method. EBID has since used Al-Haddad's model to estimate the savings from reduced canal seepage with plans to develop additional methodologies for estimating reduction in seepage in the near future.

EBID's SCADA Department constantly meters and records canal flows both with real-time measurements and with instream measurement techniques. EBID's ditch riders measure and determine delivery volumes then record these within EBID's computer system. Combining these two sets of measurement records has proven reliable and EBID staff uses these measurements daily, monthly, and annually to evaluate losses and canal delivery efficiencies. Losses based on measured inflows and deliveries for unimproved and piped canals will be analyzed and summarized for comparison with Al-Haddad's findings.

Based on the research at New Mexico State University published by Al-Haddad in 2005, it is calculated that piping 7,580 feet of the tail end of the California Lateral and 5,960 feet of the heading of the California Extension will result in a reduction of seepage associated with EBID surface water deliveries of 987 acre-feet per year, as discussed in the beginning of Section 1.4.1 above. This translates into an equivalent increase in water supply for all water-righted acres within EBID.

The three water savings components for Modernizing the California Lateral and Extension – canal seepage, on-farm deep percolation, and conveyance from the piping component – are analyzed based on best available information. Calculation sources are included in the right-hand column of **Error! Reference source not found.Error! Reference source not found.** above, with the variables/letters in the formulas referring to the letters on the left-hand side.

A study conducted in New Mexico in 1999 reported that an estimated "40% of the total surface water withdrawals for irrigation" was lost due to transit within the canals and laterals (Wilson, 2003). These losses can be due to seepage in the unlined canals, degrading components of the delivery/diversion systems, and over vegetation within the conveyance canals. This same study reported that the piping of canals can have more than 95 percent conveyance efficiencies (Wilson, 2003). This indicates that for Modernizing the California Lateral and Extension, the section of these canals that are to be piped will go from losing 40 percent of the conveyed water to losing 5 percent or less, meaning that the conveyance, or transit, losses are virtually eliminated.

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

EBID's Irrigation Systems Department and SCADA Department work together each year to evaluate operational efficiencies and losses through diversion and delivery accounting. Some years further evaluation is needed for certain portions or reaches of the District. Table 4 shows conveyance loss evaluation for both unimproved (unlined earthen) and piped EBID canals evaluated during the 2012 water season. As EBID has improved its SCADA systems and canal measurements, it has become more possible to quantify system losses and waste/spill. Until the system is more complete, it continues to be difficult to precisely determine system wide operational losses, thus evaluating the conveyance loss and performance of specific canals is some of the best information readily available. Reduction of spills is not the basis of water savings for this project, but accounting for any spills out of Wasteway 13 is certainly an added benefit.

Quantifying the water conservation effects of implementing or improving flow measurement capability is paradoxical because water conservation implies reduction in use over a predetermined base-line. With no reliable *a priori* base-line, or a highly flawed one, specific quantification becomes highly speculative. Water managers world-wide, and EBID, have embraced flow measurement as foundational for water conservation planning, implementation, management, and evaluation. The improved flow measurement proposed here will provide data for comparison of prior, albeit flawed, flow data and the development of a more reliable baseline for future conservation planning and implementation.

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

Currently, flow measurements are conducted manually with in-channel measurement techniques using a Global Water FP111 Digital Water Velocity Meter. Manual velocity readings are conducted at 0.5 to 1 foot increments, while positioning the flow meter at 60 percent of the observed water depth. Total water depth and increment size are used to manually calculate the section area which is multiplied by the section velocity to approximate section flow. All section flows are summed for total flow and tracked by a meter note filled out by our field personnel. Flow measurements are taken periodically over the duration of the irrigation and averaged over the same period of time.

Flow measurements conducted by the field probe are susceptible to operator error, which can cause the accuracy to vary. Combined with taking only periodic field measurements as time permits, the averaged flow value can also vary due to fluctuations in water pressure. Installation of ultrasonic doppler meters, which measure velocity and depth/area of the water, combined with an RTU averaging readings every minute for 30 minutes, vastly improves accuracy at the proposed sites. Each doppler meter will be periodically checked to ensure accuracy by metering each canal with a doppler channel profiler boat. The RTU flow reading requires a coefficient of discharge factor, which can be adjusted based on the field measurement checks.

Detailed descriptions of all proposed flow measurement devices, including accuracy and the basis for the accuracy.

The biggest benefit of the proposed measurement improvements will be real time measurements leading to calculated velocity and totalized volumes. See Figure 14 for the locations in which installation of improved metering technology is planned to be installed for the Modernizing the California Lateral and Extension component of the project. The proposed flow measurement devices described below will be connected to an EBID installed RTU to transmit the data to EBID's SCADA network.

Ultrasonic doppler open channel velocity and depth measurement devices

Doppler current meters designed to measure water velocity, water level, and calculate flow will be installed within the pipeline of the Modernizing the California Lateral and Extension portion of the project. Two examples of this kind of in-channel flow meter are SonTek-IQ and Greyline Ultrasonic flow meters. Both product lines provide the technologically advantaged complex current profilers in easy to use packages. Accuracy greater than one percent of measured velocity is expected from either supplier based upon their readily available data sheets. These example sensors both measure velocity and level within the known channel (circular pipe) to calculate flow.

Magmeter flow measurement devices

Electromagnetic flow meters, also commonly known as magmeters, will be installed to measure the output of each of the lift pumps installed. These meters are required to provide highly accurate volumetric flow measurement. The electromagnetic meter technology is based on Faraday's Law which states that when a conductor moves through a magnetic field a voltage will be produced. The Magmeter sensor produces a magnetic field, and as a conductive material passes through the magnetic field, a voltage is produced. This voltage is measured by two sensor electrodes, which eliminate any moving parts susceptible to damage from usage, improving accuracy and reliability of the sensor. The two metallic pins located at the tip of the sensor measure the voltage, which is then converted into a frequency that is proportional to the flow rate. Accuracy of measured values with common metal magmeters, such as Georg Fisher 2552 that EBID has installed on previous projects, is plus or minus two percent based upon their readily available data sheets.

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

It is not expected that farm delivery volumes will be increased or decreased, just more accurately accounted for. The complete proposed project will definitely conserve water as described above, but changes in delivery are not expected to be increased or decreased. EBID ditch riders are required to meter flows at the beginning, middle, and end of each irrigation. Members often complain that their deliveries are less than measured since hydraulic head in the canal varies, sometimes significantly and sometimes when the ditch rider is managing other deliveries. Thus, irrigation delivery volumes could in-fact be larger but more accurately and more precisely accounted for with real time measurements. Improved accuracy and precision in flow and delivery measurements will also help resolve conflict between EBID and its members. As EBID improves its SCADA system of canal and delivery flow measurements, EBID will be able to better account for the limited water supply we deliver.

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

Actual water savings will be quantified and verified following completion of the project by comparing post-project water measurements of the ratio of deliveries to diversions to pre-project data and estimates while considering other factors which may have caused changes. EBID's SCADA Department data of inflows, outflows, and deliveries utilizing this project's improved metering will determine actual canal loss seepage reductions. Some of the realized delivery improvements will be verified utilizing the collected data, farm order history, and delivery timing compared to orders placed. These delivery improvements will be studied in comparison to past order history and available information to analyze changes. The improved metering proposed by this project will be critical to improving the information available for analysis.

1.4.2. Evaluation Criterion B — Water Supply Reliability

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

Rio Grande Project supply for EBID, EPCWID, and Mexico is released from storage in Elephant Butte Reservoir and regulated through Caballo Reservoir. Orders for EBID, EPCWID, and Mexico are summed and the release gates at Caballo Dam are adjusted to meet the specific demand. The release gates' adjustment accounts for gains or losses in the system and lag times to the diversion points. The districts and Mexico each have an allocation for diversion from the Rio Grande. The methodology for determining these diversions is described in the Operating Agreement and Operating Manual that the two districts and Reclamation negotiated and approved in 2008.

EBID has only had one year of three foot allotment since 2002 due to the persistent and increasingly severe drought in the area. The Rio Grande Project experienced a similar drought cycle from 1951 through 1978, with very short years interspersed with an occasional wet year of full supply. From 1979 through 2002, both districts and Mexico had full allocation on January 1st of every year. Having occurred for 24 consecutive years, full supply came to be considered a normal year, when the reality is that it is not. The last eighteen years have reminded us that

drought and shortage is more normal than full supply, making water conservation all the more important.

Given its allocation for diversion, EBID's Board of Directors sets the allotment for delivery to constituents' farm gates by estimating the conveyance efficiency (delivery/diversion), and allotting water pro-rata to the district's 90,640 acres. During the full supply years of 1979 through 2002, with a three-foot allotment every year, the conveyance efficiency was about 65 percent. Of the 35 percent loss, about 10 percent was attributed to losses in the main canal system and 25 percent was attributed to losses in the canals.

In the eighteen years since 2002, the allotment has only been full once in 2008. In 2003 and 2004, the allotment was only eight inches. In 2011 the allotment was four inches and in 2012 it was ten inches. The year 2013 saw the worst water supply in the over 100-year history of the Rio Grande Project, with an allotment of only three and a half inches. In 2014, EBID's members received seven and a half inches per acre, in 2015 it was eleven inches, and in 2016 it was thirteen inches.

The 2017 allotment to EBID farmers was 24 inches, a level not seen since 2010, but a full allotment is 36 inches. Following 2017, the allotments for 2018 and 2019 were 10 inches and 14 inches, respectively. This past year, 2020, saw an allotment of 14 inches, making the average allotment of these last 15 years just under 16 inches. While the improved supply of 2017 reduced the aquifer decline, effects of the previous years of hard drought are still quite evident.

Since a significant portion of the losses are fixed and independent of flow rate, the conveyance efficiency gets lower in short supply years and has generally been at or below 50 percent in the latest drought. Indirectly, canal losses are reflected in EBID's overall conveyance efficiency, the ratio of farm deliveries to river diversion charges. This is a critical statistic, because the volume of water available for allotment for farm delivery is determined as the allocation for river diversion times the conveyance efficiency. For a given river diversion allocation, higher conveyance efficiency directly gives higher allotment for farm delivery of surface water. The short supply compounded by higher relative losses makes drought particularly painful in EBID, making it much of the motivation for this project.

The proposed work makes more surface water available to farmers at their head gates and allows them to convey groundwater more efficiently when they utilize EBID facilities to do so. Both effects reduce the farmer's dependence on groundwater, which in the current drought is in decline. EBID has been sustainable in the long term because of the ready access to groundwater in drought that is replenished in wetter times. The objective here is to reduce the reliance on groundwater, thus reducing the amount of pumping and energy required for agricultural production. By focusing on delivering the maximum surface water possible, EBID is addressing long term water reliability concerns by maximizing the limited supply available to EBID and conserving groundwater for the future. This will be achieved by the pumping of surface water directly from the Rio Grande through plastic irrigation pipe into the California

Lateral and the Three Saints Main Canal, which reduces the distance the water has to travel to get to the farmers in these areas.

As described in detail in Section 1.4.1, the sum of total conserved water due to Modernizing the California Lateral and Extension and Revitalizing the Three Saints Main Canal at Wasteway 19 measures is estimated to be 9,059 acre-feet per year. Of this, EBID estimates a reduction of canal seepage losses due to the piping of the California Lateral and California Extension of 987 acre-feet per year, estimates reduction in conveyance loss for the flows required to serve the California Lateral and California Extension is 3,696 acre-feet per year, and estimates conveyance losses to be reduced by 1,728 acre-feet per year due to Revitalizing the Three Saints Main Canal at Wasteway 19. The total expected savings, which will be shared pro-rata among EBID farmers annually, is 6,411 acre-ft which equates to 0.85 inches per acre annually.

Will the project make water available to achieve multiple benefits or to benefit multiple water users?

EBID's primary focus is on the delivery of surface water to its farmer constituents. However, EBID does have constituents that are not traditional irrigation farmers.

In the early 2000s, the Lower Rio Grande Water Users Organization, which includes major water providers between Elephant Butte Dam and the Texas state line, developed the Special Water Users Association concept, which provides for acquisition of EBID surface water rights for use by Municipal and Industrial (M&I) water users for use in planned surface water treatment plants. This development was confirmed in state statute and EBID policy. Subsequently, the City of Las Cruces (CLC) has acquired water rights to over 1,300 acres of EBID assessed land. While CLC has not yet built a surface water treatment plant, they do lease their annual allotments back to farmers to offset their assessments. The proposed project will immediately increase the lease-back value of their water rights, and in the long term, improve their allotments for use in a surface water treatment plant.

In the 2010s, EBID consummated an Environmental Water Policy agreement negotiated by the US Section of the International Boundary and Water Commission (IBWC) and Audubon-New Mexico. The objective of the agreement was to provide EBID water for riparian habitat restoration along the Rio Grande. Essentially, environmental interests aiming at riparian habitat restoration are treated as EBID farmers, with all the rights and responsibilities. The agreement was formalized in EBID's Environmental Water Policy (EWP). The benefits accrued by EBID farmer constituents will be shared proportionally by IBWC and any other individuals participating in the EWP.

The proposed project benefits multiple sectors, including all groundwater users, by reducing the pumping required of the alluvial aquifers. A reduction of pumping basin-wide reduces the impact pumping has on the Rio Grande. By providing more surface water for EBID's annual assessment, less pumping is required which reduces the energy and cost per acre required for all members of EBID, including rural and economically disadvantaged communities. By leaving

the water in the river longer for pumping/delivery further downstream, the flow in the river is increased slightly which makes for a small benefit for recreation and wildlife.

Pipeline and pumping projects benefit EBID and its farmers in various ways including reduced seepage, reduced hydraulic roughness of the canal allowing for less head loss along each canal, reduced vegetation/weed control required, reduced maintenance, improved safety, and improved transmission of groundwater. These improvements to the tail end of our system also benefit the upstream farmer whose water order delivery will be less tied up by those downstream.

The high-flow, low-lift pumps delivering water from the Rio Grande at EBID's Wasteway 13 and Wasteway 19 will greatly improve the timeliness, reliability, and efficiency of farm deliveries of water orders for the users along the tail end of the California Lateral and the Three Saints Main Canal. Those along the California Lateral and Three Saints Main Canal will be delivered surface water via these pumps when it is the most effective method of delivery. By supplying the demand of the California Lateral and a portion of the demand of the Three Saints Main Canal directly from the Rio Grande, less water will be lost to the inefficiencies of the canal system because of the avoidance of the 22.44 miles of unlined canal between the Leasburg Dam and the new supply point at Wasteway 13 and the 14.2 miles of unlined canal between the Mesilla Dam and the new supply point at Wasteway 19. This decrease in losses will be shared as a part of a larger allocation for all EBID members. Improved delivery timeliness will enhance EBID cooperation with farmer irrigation scheduling and, therefore, improve on-farm irrigation efficiencies and ultimately crop production. The improved delivery timeliness from the proposed pumps will not only be felt by the users on the tail end of the California Lateral and the Three Saints Main Canal, but by all users throughout the Mesilla Valley on the Leasburg Main Canal and the Eastside Main Canal operating systems. This is because the canal capacities upstream will be less tied up trying to deliver water to the tail-end users. Higher delivery flow rates will be available when needed to farmers upstream of the project area as main canal capacity is freed up and farmers in the project area will receive higher flow rates as their deliveries do not have to run the gauntlet of the upper system. Increased delivery flows rate is key to on-farm efficiency using improved surface irrigation methods.

Likewise, those that receive improved scheduling and delivery upstream and downstream of the components of this project will have improved potential for future water conservation improvements. This improved scheduling for the Mesilla Lateral and Three Saints Main systems also reduces conflicts with EBID and with neighboring farms over the ability to receive water when they need it. These improvements and reduction of conflicts promote and encourage collaboration among EBID and its members in a way that helps increase the reliability of the water supply through a more cooperative attitude.

The farmers that are directly benefitting from improved timeliness of delivery due to this project are fully behind the plans to improve the irrigation system. Both components of this project have full support of those along the canal including those upstream, downstream, and those most directly benefitting from improved timeliness of delivery. Widespread support for

piping and lining projects as well as addressing tail to head issues has been expressed by all EBID members that understand the project.

EBID has received unprecedented buy-in from Stahmann Inc. in both collaboration towards the vision and specifics of Modernizing the California Lateral and Extension as well as agreeing to contribute towards EBID's cost share, further leveraging limited funds.

Likewise, EBID has also received incredible buy-in from DORMAC LLC, McCilli Farm LLP, and Salopek Foundation farms which are those that benefit most directly from improved timeliness of deliveries due to Revitalizing the Three Saints Main Canal at Wasteway 19. The owners of these farms have collaborated in the development of the scope of this component of the project and have also contributed towards EBID's cost share, further leveraging limited funds.

Letters of commitment are attached from the owners of the farmers most directly benefitting from improved delivery timing of each component for the project. For Modernizing the California Lateral and Extension, Stahmann Inc. has committed $200,000 towards the materials required to make up EBID's cost share. For Renovating the Three Saints Main Canal at Wasteway 19 DORMAC LLC, McCilli LLP, and Salopek Foundation together have committed $140,000 towards the materials required to make up EBID's cost share. These commitments are not intended to be third-party contributions directly to the project and overall budget, EBID's Board has already committed to guarantee a minimum of 50 percent cost match towards the request for Federal funding. Thus these commitments by EBID members towards EBID's cost share have not been included within the Budget Proposal in Section 2 as third-party contributions but are only noted here to demonstrate the level of buy-in and desire for the proposed project.

Modernizing the California Lateral and Extension will contribute to and enhance Stahmann Inc.'s current and future on-farm improvements. Conservation improvements by DORMAC LLC, the farm adjacent to Wasteway 19 which will receive a direct addition of 5,000 gpm to an existing pipeline, will be enhanced by completion of the project. These direct injections of surface water will further improve both farms in such a way that water consumption and dependence on groundwater can be reduced. Improved delivery pressure and the ability to receive precise delivery scheduling will also greatly improve on-farm irrigation efficiency which, in turn, increases yield and other on-farm improvements.

An additional benefit of piping the California Extension and a portion of the California Lateral is the improved transportation of groundwater when surface water supplies have been exhausted which then creates an increased reliability in the supplemental supply required to produce successful agriculture in times of drought.

1.4.3. Evaluation Criterion D — Complementing On-Farm Irrigation Improvements

Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies. Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.

In the area of impact for the project component Modernizing the California Lateral and Extension, Stahmann Inc. currently has some select blocks of pecan trees that are irrigated with either drip tape or sprinklers. Drip and sprinkler irrigation systems can improve irrigations compared to flood irrigation techniques by reducing the ratio of total water used to water consumed by the trees, applying the water directly and more evenly to the trees' root zones, reducing erosion, and overall improving plant growth. This farm is of significance to the area and can greatly benefit from EBID's project plan of installing a pressurized pump system along the California Lateral. Stahmann Inc. currently must rely on their wells to pump water into their drip and sprinkler irrigation systems. With the installation of the pressurized pump system to get water out of the Rio Grande, Stahmann Inc. can tie into this system and begin to service those blocks with surface water rather than groundwater. Doing this will help conserve the store of groundwater in the aquifer and will help Stahmann Inc. maintain healthy trees since groundwater can sometimes hold large concentrations of salts and other minerals that could be harmful to crops. With this project's pump system, Stahmann Inc. can move forward with their plans to incorporate more blocks of drip and sprinkler irrigation systems to continue improving the health of their pecan trees and improving their crop yield.

Stahmann Inc. has previously requested technical or financial assistance from the NRCS and have intentions to apply for it again. Attached in the within the letters of support Section 5 is a letter of intent from Stahmann Inc. stating that the farm has intentions of applying for NRCS funding to install more drip and sprinkler irrigation. This type of on-farm efficiency project would be eligible for NRCS programs such as the Environmental Quality Incentives Program (EQIP) since it would help with the conservation of ground and surface water.

Not only does this project facilitate Stahmann Inc.'s current and future on-farm improvement projects through providing pressurized pumps for surface water flows, but it will assist in overall maximization of efficiency in the impacted areas for both components of this project. This project will improve reliability, timeliness, and flow of water deliveries to these areas, which will allow for better on-farm irrigation scheduling, increasing the efficiency at which farmers can water their crops.

Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.

On-farm water use efficiency to be expected from Stahmann Inc.'s planned improvements will be directly related to the efficiency of their irrigation practices. Drip irrigation systems have average efficiency ratings from 80 to 90 percent and solid set sprinkler irrigation systems have average efficiency ratings from 70 to 80 percent (Mays, 2001). Sprinkler irrigation systems can be on the lower side of their average efficiency rating due to wind, drift, evaporation, and poor distribution, but since these sprinklers will be used within a pecan orchard that offers protection from the wind due to the large trees acting as a windbreak and a large canopy that

helps to reduce evaporation losses it can be predicted that efficiency will be on the higher end of the range (Mays, 2001).

Estimating the potential on-farm water saving that could result from a combination of Modernizing the California Lateral and Extension and a complete buildout of drip or sprinkler for this portion of Stahmann Inc is based on an estimated increase in on-farm from 55 percent to 80 percent. With 1,073 acres of irrigated pecans making up this portion of Stahmann Inc., annual field delivery requirement of 4.5 acre-feet per acre, and a 25 percent increase in on-farm irrigation efficiency, potential on-farm savings are calculated to be 1,207 acre-feet per year. For EBID water service area boundaries to help the NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance, please see Figure 19.

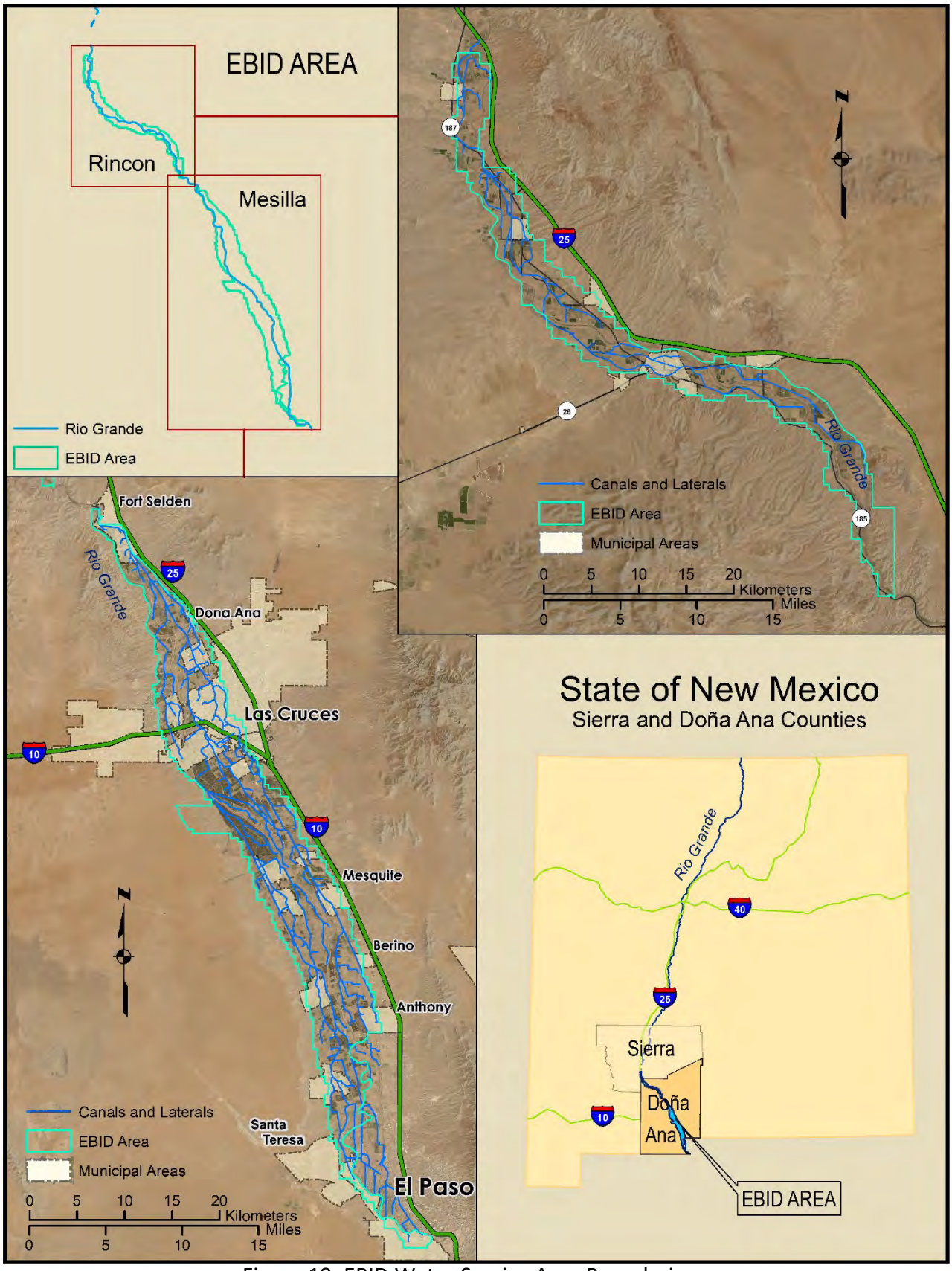

Figure 19: EBID Water Service Area Boundaries

1.4.4. Evaluation Criterion E — Department of the Interior and Bureau of Reclamation Priorities

Department Priorities

- Creating a conservation stewardship legacy second only to Teddy Roosevelt

Through experience and science EBID is proposing a water conservation measure that is in line with the Department of the Interior's conservation stewardship legacy. The proposed project is a direct adaptation to changes in the environment, climate change, and drought. This proposed project implements one of EBID's goals of piping problematic sub-laterals with excessive seepage and operational losses and maximizing the benefit of Rio Grande Project surface water. By improving EBID's dendritic canal system, EBID has identified and addressed an opportunity to improve a Project water transportation and distribution system and is seeking to resolve conflicts.

- Utilizing our natural resources

The proposed work makes more surface water available to farmers at their head gates and farmer pumped groundwater can be conveyed more efficiently. Both effects reduce the farmer's dependence on groundwater. The objective here is to reduce the need for groundwater, thus reducing the amount of pumping and energy required in agriculture. These positive impacts allow for a reduction of power consumed and cost for producing food and fiber in New Mexico and meeting American economic needs.

To address a true comprehensive conservation stewardship legacy, we would be remiss to not notice that the new pumps to be installed will require significant power resources. Addressing this nexus is a worthy component of this project and is crucial in addressing the use of our natural resources.

EBID has always run as a gravity system until recent conservation measures have required high-flow, low-lift axial flow pumps. The proposed work will require energy to power pumps to lift water from the Rio Grande at Wasteway 13 to the California Lateral and from the Rio Grande at Wasteway 19 to the Three Saints Main Canal. EBID therefore will use current EBID right of way land and land made available by burying canals in pipe to implement solar arrays to keep the project as energy neutral as possible.

The water conservation - energy nexus created by lifting water to improve irrigation timing and reduced demand on the upstream canals for the tail-end users is proposed to be offset by installing a solar panel arrays for both components of this project. For Modernizing the California Lateral and Extension, the solar panel arrays will be installed along the piped canal. These solar arrays will offset 40 percent of the power required for a six-month surface water delivery season if the pumps are run roughly two weeks per month.

For Revitalizing the Three Saints Main Canal at Wasteway 19, the solar panel arrays will be installed within EBID's existing right of way along Wasteway 19 on the canal side of the river levee. These solar arrays will offset 47 percent of the power required for a six-month surface water delivery season if the pumps are run roughly two weeks per month.

18 kW of solar electric capacity will be installed for each component of this project. These solar panels will be connected to El Paso Electric's grid as will the required lift pumps on the river. The objectives of the solar arrays are to offset the energy cost of the river lift pump operations with revenue from the sale of the solar electricity and to minimize the carbon footprint of the project. No water will be required for this renewable energy system. The annual energy production of the solar arrays for Modernizing the California Lateral and Extension was calculated to be 32,850 kWh and the consumption by those pumps were calculated to be 81,349 kWh, which results in 40 percent of the energy required by the pumps being offset by the solar array. The calculations and results for Modernizing the California Lateral and Extension can be found in Table 2. The annual energy production of the solar arrays for Revitalizing the Three Saints Main Canal at Wasteway 19 was calculated to be 32,850 kWh and the consumption by those pumps were calculated to be 70,503 kWh, which results in 47 percent of the energy required by the pumps being offset by the solar array. The calculations and results for Revitalizing the Three Saints Main Canal at Wasteway 19 can be found in Table 3.

Table 2: Solar Array Energy Offset Calculations – Modernizing the California Lateral and Extension

Var	Solar Array System Production		Source
AG	18	kW solar array	Project Plan
AH	5	Effective hours per day over the year	Average
AJ	32,850	kWh per year from a 18kW array at project location	AG*AH
	Pump Power Requirements		Source
AK	15,000	gpm	Project Plan
AL	9	ft lift	Project Plan
AM	34.1	HP	AK*AL/3960
AN	48.7	BHP (@70% efficiency)	AM/70%
AO	36.32	kW for both pumps	AN*0.7457
AP	12	weeks per year estimated (2 weeks per month for 6 months)	Est.
AQ	73,214	kWh for both pumps if run for 12 weeks per year	AO*AP*7* 24
	Offset of Pump Power Requirement		Source
AR	45%	% of energy required by pumps will be offset by solar array	AJ/AQ

Table 3: Solar Array Energy Offset Calculations – Revitalizing the Three Saints Main Canal at Wasteway 19

Var	Solar Array System Production		Source
AS	18	kW solar array	Project Plan
AT	5	Effective hours per day over the year	Average
AU	32,850	kWh per year from a 18kW array at project location	AS*AT
	Pump Power Requirements		Source
AV	15,000	gpm	Project Plan
AW	10	ft lift	Project Plan
AX	37.9	HP	AV*AW/3960
AY	54.1	BHP (@70% efficiency)	AX/70%
AZ	40.35	kW for both pumps	AY*0.7457
BA	12	weeks per year estimated (2 weeks per month for 6 months)	Est.
BB	81,349	kWh for both pumps if run for 12 weeks per year	AZ*BA*7*24
	Offset of Pump Power Requirement		Source
BC	40%	% of energy required by pumps will be offset by solar array	AU/BB

- Restoring trust with local communities

This project has the goal of bettering EBID's relationships with our neighbors that border our land. We have worked hard to include constituent farmers in the plans for this project to ensure that their needs are being met and that our resources are best assisting them. These farmers have utilized our open lines of communication to better this project and their voices have be critical in the development of this project.

This project will also benefit non-traditional agricultural water users pro rata who, through EBID's adaptive policy development, are fully vested EBID constituents. These include the City of Las Cruces and Dona Ana Mutual Domestic Water Users Association, who own EBID water rights under the Special Water Users Association district policy and state statute, and the US International Boundary and Water Commission under the District's Environmental Water Policy.

- Modernizing our infrastructure

While gravity-fed irrigation through unlined, earthen canals has been utilized in this region for over 100 years and has facilitated a productive agricultural district, the system can be improved upon. The addition of piped canals and pumping systems will modernize the infrastructure of EBID in the best interests of water conservation and efficiency.

Piping the proposed portion of the California Lateral and California Extension exemplifies the Department of Interior goals of modernizing our nation's infrastructure. This goal of the proposed infrastructure construction serves American needs through water conservation which in hand addresses cyclical and deferred maintenance by bringing the aging infrastructure to a modern standard and reducing maintenance in a problematic area.

In EBID's efforts to modernize our infrastructure we have facilitated private sector investors to contribute to serving the needs of the community. This project involves cost sharing and investments with constituent farmers to leverage EBID's limited budget. The partnership between EBID and these private farming groups is supporting the modernization of EBID's infrastructure and a great example of a public/private partnership.

Reclamation Priorities

- ### Increase Water Supplies, Storage, and Reliability under WIIN and other Authorities

This project's main priority is to increase the reliability of water delivery to farmers through improvements within EBID's system. With the combination of piping canals and implementing pumping systems, EBID will improve water deliveries and on-farm efficiencies. The pumping systems, specifically, provide our farmers with the assurance that surface waters can still be pumped to them in the cases that water deliveries through the gravity-fed system from the main diversion dams are less than what is required.

- ### Streamline Regulatory Processes and Remove Unnecessary Burdens to Provide More Water and Power Supply Reliability

EBID's regular processes for upkeep of their open canal system involve large amounts of maintenance, including dredging of canals, mowing down vegetation, spraying to control vegetation, cleaning of debris from mechanisms/inline structures, and more. Without those processes our irrigation surface water delivery system would not remain functioning, but they require much time and effort. This project will help to streamline some of those processes and help to completely remove many burdens of a gravity-fed, open canal system. By piping a significant portion of our system, EBID removes the need to dredge out open canals and the concern of vegetation reducing delivery flows. The installation of pump systems ensures water delivery reliability by providing an additional source for receiving surface water when deliveries from the gravity-fed system are not enough.

- ### Leverage Science and Technology to Improve Water Supply Reliability to Communities

The proposed project increases the reliability of Rio Grande Project surface water. The proposed proven water conservation measure will stretch the limited natural resource available to EBID, New Mexico, and the Rio Grande Project and conserve critical groundwater that provides EBID's farmers resiliency in drought. EBID's gravity flow system can be improved through science and technology including the use of modern materials for piping and lining the water conveyance system. At EBID science and technology are being leveraged to determine the best conservation measures and to prioritize which locations are best suited for conservation measures. Examples of leveraging science and technology include EBID's Groundwater Resources and SCADA Departments who assist with identifying areas or critical groundwater recharge and excessive canal seepage. Tools such as the proposed ultrasonic flow sensor allow for accurate flow measurements and calibration of canal efficiency models. The proposed water conservation measure is specifically chosen to address ongoing drought by stretching EBID's limited water supply in both delivery efficiency and on-farm efficiency for our community of farmers.

- Address Ongoing Drought

New Mexico has been experiencing drought for many years and with climate change factors making it so major and often strenuous climate events are becoming more extreme and unpredictable the need for conservation measures is beyond apparent and dire. With the ongoing drought, a full allocation of surface water for the district has not been available for many years. This puts a strain on the farmers and pushes EBID to be more and more mindful of our water conservation methods. This project is fully intended to address drought issues and improve our water conservation. The planned pipeline and pumping systems will reduce seepage and other conveyance losses so that EBID's limited supply of allocated surface water can best serve our agricultural community.

- Improve Water Supplies for Tribal and Rural Communities

A priority of EBID's is to improve our water deliveries to our farmers. The measures and canal improvements that are a part of this project address the downstream Leasburg Canal and Mesilla Lateral constituents which are, by definition, a rural community. These rural community farmers are the heart and soul of the economy in southern New Mexico and improvements to their water supply benefit New Mexico and the US economy.

1.4.5. Evaluation Criterion F — Implementation and Results

1.4.5.1. Project Planning

Does the applicant have a Water Conservation Plant 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.

The piping of laterals and sub-laterals was envisioned in the Lower Rio Grande Regional Water Plan, which was composed by the Lower Rio Grande Water Users Organization (LRGWUO, of which EBID is an active member) and accepted by the New Mexico Interstate Stream Commission in 2004. The type of system efficiency improvement project was also included within the 2017 Regional Water Plan as a Strategy to Preserve Agriculture. Documentation of these existing planning efforts can be found at:

- https://www.ose.state.nm.us/Planning/rwp.php
- https://www.ose.state.nm.us/Planning/RWP/11_LRG/1999/LOWER-RIO-GRANDE-REGIONAL-WATER-PLAN.pdf

This proposed project implements a goal of piping problematic sub-laterals with excessive seepage and operation losses and tail to head disparities in delivery timing. This project addresses problems identified in both plans listed above of maximizing the benefit of Rio Grande Project surface water. Both plans listed above include the priority of piping sub-laterals of EBID's system to address excessive system losses and improving irrigation delivery scheduling to improve system wide efficiencies. The components of this project are selected as priorities opposed to other potential projects because the California Lateral, California Extension, and Three Saints Main Canal are known to be the most problematic areas within EBID's system for delivery and scheduling timeliness. This proposed project is also selected over

other measures and potential projects because of its huge benefits and fits well within the Bureau of Reclamation vision of water and energy efficiency projects.

1.4.5.2. Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits up completion of the project (e.g., water saved or better managed, energy generated or saved).

The performance of the canals to be piped and supplemented by pumps as proposed by this project will be evaluated for losses and delivery efficiency based on measured inflows and outflow after the pipe and pumps are installed using this method. The key performance factors we will use to assess the project impact will be the unit and diversion delivery efficiencies. The unit efficiency is the ratio of the unit farm deliveries to the operational unit diversion.

Performance measures for the proposed work will be carried out by EBID staff, consultants, and collaborators. The benefits of the pipelines expected to arise from three effects of the work are 1) seepage reduction in the piped canals, 2) seepage reduction from reduced conveyance distance and tail-to-head re-plumbing, 3) reduced on-farm deep percolation losses resulting from higher delivery flow rates. Performance measures for each of these follow.

<u>Seepage Reduction in the Piped Canals</u>

EBID and its engineering consultants have experience evaluating the performance of pipe canals as described above within the response to Evaluation Criterion A. Actual water savings will be quantified and verified following completion of the project by comparing post-project water measurements of inflow and outflow. At least three tests during the irrigation season following completion of the project will be performed to compare to pre-project data and estimates while considering other factors which may have caused changes. EBID's SCADA Department data of inflows, outflows, and deliveries utilizing this project's improved metering will determine actual canal seepage loss reductions. Some of the realized delivery improvements will also be verified using the collected data, farm order history, and delivery timing compared to orders placed. These delivery improvements will be studied in comparison to past order history and available information to analyze changes. Seepage reduction will be compared to water savings measurements as determined by Al-Haddad, 2005 described above.

<u>Seepage Reduction from Reduce Conveyance Distance</u>

EBID's SCADA Department consistently meters and records canal flows both with instream measurement techniques and with real time totalizing measurements at specific locations. EBID's ditch riders measure and determine delivery volumes and record these within EBID's computer water management system. Combining these two sets of measurement records has proven reliable and EBID staff uses these measurements daily, monthly, and annually to evaluate losses and canal delivery efficiencies. EBID tracks its conveyance efficiencies on a unit-by-unit basis and has done so for more than a decade. The effects of shortened conveyance distance and changing delivery from the river instead of the lengthy canal system are not separable, so they will be evaluated in combination. The conveyance efficiencies measured

after improvement will be compared with historical efficiencies at similar levels of water supply to quantify, both on efficiency and a water saving bases. The conveyance efficiency of the Mesilla Lateral, California Lateral, and the Three Saints Main Canal will be evaluated from the data collected to determine if the expected decrease in conveyance/transit losses is achieved due to the tail-head improvements and direct injection provided by the pumps into the California Lateral and Three Saints Main Canal.

Reduced On-Farm Deep Percolation Losses

EBID will use its close working relationship with New Mexico State University to evaluate the improvement in on-farm efficiency due to the proposed improvements within the directly benefited farm of Stahmann Inc. The senior level design class, Agricultural Engineering 478: Irrigation and Drainage Engineering, performs laboratory assignments on EBID constituents' farms. Using standard methods, the students measure soil infiltration parameters, water holding capacity, and antecedent moisture conditions before an irrigation. During the irrigation, students measure the inflow, advance times to stations along the field, and recession times. They then calculate the irrigation application efficiency (irrigation water stored in the root zone divided by applied water) and the deep percolation percentage (water deep percolating past the root zone divided by applied water). A volume balance model is developed and calibrated from these data that allows students to determine what the application efficiency would have been at the historical delivery rate, which will be determined from the district's delivery database. A report will be provided by these students, via EBID's consultant hydrologist to compare farms with and without these improvements within one year following the completion of improvements. If NMSU's AEN 478 class is unable to perform this, EBID's Engineering Department personnel will work with other departments to lead a similar study of the subject farm.

1.4.5.2.1. Readiness to Proceed

EBID is experienced in the design and construction of similar projects and management of similar grants. EBID is ready to proceed following a signed contract with the Bureau of Reclamation and completion of NEPA compliance processes. Project Manager and District Treasurer/Manager is Gary Esslinger who has overseen numerous significant projects including piping canals and similar projects in his 40+ years with EBID. Design will be completed by EBID personnel under the direction and supervision of Zachary Libbin, PE, District Engineer. Construction will be performed by EBID personnel under the Leo Barrett, Maintenance Projects Director. Procurement and financial accounting will be performed by Gail Norvell, EBID Finance Director, and installation of metering and RTUs will be performed by EBID personnel under the direction of Patrick Lopez, EBID SCADA Systems Director.

Identify and provide a summary description of the major tasks necessary to complete the project.

Preconstruction activities include:

- NEPA compliance and any necessary permitting in cooperation with BOR and IBWC
- Finish design of all components
- Review of final design with directly impacted producers

- Finetuning of project scheduling for all components
- Finalizing and executing small land-swap with Stahmann Inc. to realign California Lateral

Construction activities include:

- Earthwork in preparation of the pipeline and concrete structure construction
- Laying pipe, including establishing the grade and slope of the pipe and bedding the pipe for a suitable foundation
- Connecting the pipe and ensuring complete seal
- Installing alfalfa valves for portions requiring direct farm delivery
- Forming and placing concrete for required structures, including:
    - Pump box structures
    - Check and diversion structures of CMP pipeline
- Backfilling pipelines and concrete structure with adequate compaction
- Final grading of sites, including bollard placement surrounding structures likely to be damaged by vehicles or equipment
- El Paso Electric extension of their three-phase power grid
- Installation of electrical components and connection to El Paso Electric grid
- Installation of high-flow, low-lift pumps
- Construction of foundation/posts for solar panel arrays
- Installation of solar panels atop EBID posts
- Connection of pipeline to farmers ditches (within the limits of EBID property)

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

The entire project proposed will be located on property owned by EBID with the exception of the construction of the pump box required for Revitalizing the Three Saints Main Canal at Wasteway 19 near the river levee and within the overbank of the Rio Grande. EBID has a right to operate and maintain all wasteways including within the Rio Grande levee system as they were constructed prior to IBWC canalization and construction of the river levee. Although additional permitting is not expected, appropriate consultation with IBWC, who manage the Rio Grande, will be required prior to construction of the structure within EBID's Wasteway 19 that is located within the IBWC's levee.

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

Design and engineering of all project components will be performed by EBID under the direction and supervision of Zachary Libbin, PE (NM 22908), District Engineer. Mr. Libbin and EBID's Engineering Department are experienced and qualified in the design and engineering required for all components of the project including pipeline, earthwork, concrete structures, solar panel pedestals/foundation, and pump design/specification.

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

No new policies or administrative actions are required to implement the components of this project. EBID has worked through the administrative actions required for piping canals, solar arrays, and pumps from EBID wasteways that will flow from the Rio Grande.

EBID's experience with its Rincon WHEN (FY2014 WaterSMART grant R14AP00100) provided the opportunity to work through the administration with the New Mexico Office of the State Engineer and the Bureau of Reclamation. In summary, a permit for a new point of diversion is not required for the planned pumps because they are only an additional point of delivery accounted towards the diversion of the canal in which the canal traditionally receives its delivery. This is important that the point of diversion for the California Lateral and California Extension and the water rights of the associated land remain the Leasburg Canal at Leasburg Dam and the Three Saints Main and associated land remain the Eastside Canal at Mesilla Dam.

Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, major milestones, and dates.

Table 4 provides the estimated project schedule for major parts of the project including rough duration of the proposed work. Major milestones are provided with dates as Table 5.

Table 4. Project component timeline

Maintenance Season 2021-22						Water Season
Oct	Nov	Dec	Jan	Feb	March	
NEPA and Design						
		WW19 Pump Discharge Pipe and Electrical				
		WW19 Box Construction				
		PIP install along WW19				
				WW19 Pump Installation		

Maintenance Season 2022-23						Water Season
Oct	Nov	Dec	Jan	Feb	March	
	WW19 Solar Array					
	California Lateral Pump Box Construction					
		California Lateral CMP and PIP pipelines				
				Calif Pump Installation		

Maintenance Season 2023-24						Water Season
Oct	Nov	Dec	Jan	Feb	March	
	California Extension CMP pipeline					
		California Solar Array				
			Punch lists and closeout			

Color Key:

Three Saints Main WW19 Pump Component
California Lateral Pipelines and WW13 Pump Component
California Extension Pipeline Sub-component

Table 5. Project Milestones

Final design and construction drawings complete	11/1/2021
Environmental compliance documentation complete	11/1/2021
Coordination with IBWC and any others complete	11/1/2021
Begin on-site disturbances	11/15/2021
Pipe delivery of WW19 metal and PIP	11/15/2021
Begin pump structure and irrigation pipe within WW19	12/1/2021
Complete construction of infrastructure at WW19	3/1/2022
Complete installation and connection of pumps at WW19	4/1/2022
Begin pump box within WW13	11/1/2022
Pipe delivery of California Lateral CMP and PIP	11/1/2022
Complete installation of WW19 solar array	1/1/2023
Complete CMP and PIP pipelines for California Lateral	3/15/2023
Complete installation and connection of pumps at WW13	4/1/2023
Pipe delivery of California Extension CMP	11/1/2023
Complete California Solar Array	2/1/2024
Complete California Extension pipeline	3/15/2024
Construction, punch list, cleanup completion	3/31/2024

1.4.6. Evaluation Criterion G — Nexus to Reclamation Project Activities

Is the proposed project connected to Reclamation project activities? If so, how?

EBID is the New Mexico portion of the Rio Grande Project, which is a Reclamation Project that was authorized in 1905. The major features of the Rio Grande Project are:

- Elephant Butte Dam, a large storage dam completed in 1916 with a capacity of about 2.1 million acre-feet;
- Caballo Dam, a flood control and regulation dam completed in 1938 with a capacity of about 244 thousand acre-feet, but it is operated at much lower levels to re-regulate releases from Elephant Butte Dam to meet downstream demands;
- Elephant Butte Irrigation District in New Mexico, providing water to farmers on 90,640 acres of water-righted land in the Rincon and Mesilla Valleys;
- El Paso County Water Improvement District No. 1 (EPCWID) in Texas, providing water to 69,010 water-righted acres for irrigation in the Mesilla and El Paso-Juarez Valleys, including water supply to the City of El Paso;
- Estado Unidos de Mexico, which receives its delivery of RGP water pursuant to the 1906 *Convention between the United States and Mexico – Equitable Distribution of the Waters of the Rio Grande* at the Acequia Madre diversion from the Rio Grande on the international border between El Paso and Ciudad Juarez.

EBID's members are served by three primary diversion points – Percha, Leasburg, and Mesilla Dams. Mesilla Dam also delivers water to EPCWID's Mesilla Valley lands in Texas. EBID has about 300 miles of canals and laterals, and the district is broken up into 11 operational units that are manned by ditch riders. Only about 32 miles of laterals are currently in pipe. EBID also has about 300 miles of drains that return subsurface drainage and storm water to the Rio

Grande. Bureau of Reclamation retains title to the diversion dams and EBID operates and maintains them under contract.

With the Rio Grande Project being a Reclamation Project, and Reclamation continues to perform the central operation functions, all water delivered by EBID is Project Water. EBID coordinates operations daily with Reclamation. This project will certainly contribute to this basin and help to maintain productive agriculture in the face of drought and climate change.

Federal input and coordination with EBID are provided by the Water and Land Division of the Bureau of Reclamation. This project will not impact or benefit any tribes.

1.4.7. Evaluation Criterion H — Additional Non-Federal Funding

This proposal provides for match of non-federal to federal funding totaling 50.4 percent. By keeping the budget as low as possible and ensuring that EBID matches greater than 50 percent of Federal funding, EBID is both leveraging its limited resources as well as being efficient with the funds of both EBID and the Bureau of Reclamation.

2. Project Budget

2.1. Funding Plan and Letters of Commitment

EBID's plan for funding includes a guaranteed minimum 50 percent cost match from EBID as budgeted capital improvements. Each year EBID's Board of Directors establishes a budget which includes system improvement projects. EBID's annual budget and funding available for this project comes from annual assessment of EBID's member's water righted acreage. EBID's Board of Directors has committed to a minimum of 50 percent cost share throughout this project if funding is awarded as shown within the attached signed and notarized board of directors' resolution. EBID cost share funding will be available each year at the time of funding in forms of labor, equipment, and purchasing of materials. The budget does not include any project costs incurred prior to award. Table 5, Table 6, Table 7, and Table 8 make up with Budget Proposal and provide personnel, equipment, materials/supplies, contractual, and environmental compliance costs.

Letters of commitment are attached from the owners of the most directly benefitting farmers of each component for the project. For Modernizing the California Lateral and Extension, Stahmann Inc. has committed $200,000 towards the materials required to make up EBID's cost share. For Renovating the Three Saints Main Canal at Wasteway 19 DORMAC LLC, McCilli LLP, and Salopek Foundation together have committed $140,000 towards the materials required to make up EBID's cost share. These commitments are not intended to be third-party contributions directly to the project and overall budget, EBID's Board has already committed to guarantee a minimum of 50 percent cost match towards the request for Federal funding. Thus, these commitments by EBID members towards EBID's cost share have not been included within the Budget Proposal as third-party contributions but are only noted here to demonstrate the level of buy-in and desire for the proposed project.

2.2. Budget Proposal

Table 6: Total Project Cost

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$ 1,782,247.38
Costs to be paid by EBID	$ 1,813,735.85
Value of third-party contributions	$ -
TOTAL PROJECT COST	$ 3,595,983.22

Table 7: Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/unit	Quantity		
Salaries and Wages				
Project Director	$ 9,320	8.25	Month	$ 76,890.00
Project Director	$ 9,320	1.5125	Month	$ 14,096.50
Design/Drafting Technician	$ 3,728	2.13	Month	$ 7,940.64

Field Survey Technician	$	2,536	5	Month	$ 12,680.00
Field Survey Technician	$	2,040	5	Month	$ 10,200.00
Survey/Design Technician	$	3,168	0.9125	Month	$ 2,890.80
Field Survey Technician	$	2,024	5	Month	$ 10,120.00
Project Engineer	$	3,680	4.5375	Month	$ 16,698.00
Maintenance Foreman-Central	$	4,065	9	Month	$ 36,585.00
Heavy Equipment Operator	$	2,964	9	Month	$ 26,676.00
Heavy Equipment Operator	$	3,449	9	Month	$ 31,041.00
Heavy Equipment Operator	$	2,626	9	Month	$ 23,634.00
Welder	$	3,337	2	Month	$ 6,674.00
Welder	$	3,146	2.25	Month	$ 7,078.50
Laborer	$	1,889	9	Month	$ 17,001.00
Heavy Equipment Operator	$	2,600	9	Month	$ 23,400.00
Heavy Equipment Operator	$	2,964	9	Month	$ 26,676.00
Welder/Laborer	$	2,331	4.5	Month	$ 10,489.50
Laborer	$	1,820	9	Month	$ 16,380.00
Laborer	$	1,820	9	Month	$ 16,380.00
Welder/Laborer	$	2,080	4.75	Month	$ 9,880.00
Heavy Equipment Operator	$	2,080	9	Month	$ 18,720.00
Heavy Equipment Operator	$	2,773	9	Month	$ 24,957.00
Maintenance Foreman	$	4,853	5.75	Month	$ 27,904.75
Carpenter	$	3,519	5.75	Month	$ 20,234.25
Carpenter	$	3,406	5.75	Month	$ 19,584.50
Carpenter	$	2,756	5.75	Month	$ 15,847.00
Carpenter	$	2,851	5.75	Month	$ 16,393.25
Carpenter	$	2,721	5.75	Month	$ 15,645.75
Carpenter	$	2,453	3	Month	$ 7,359.00
Carpenter	$	1,933	3	Month	$ 5,799.00
Carpenter	$	1,933	3	Month	$ 5,799.00
Carpenter	$	1,933	3	Month	$ 5,799.00
Carpenter	$	1,933	3	Month	$ 5,799.00
Maintenance Foreman	$	4,697	1	Month	$ 4,697.00
Heavy Equipment Operator	$	3,831	0.5	Month	$ 1,915.50
Laborer	$	2,695	1	Month	$ 2,695.00
Welder/Laborer	$	3,007	1	Month	$ 3,007.00
Heavy Equipment Operator	$	3,449	1	Month	$ 3,449.00
Laborer	$	2,539	1	Month	$ 2,539.00
Laborer	$	2,600	0.5	Month	$ 1,300.00
Laborer	$	2,860	0.5	Month	$ 1,430.00
Heavy Equipment Operator	$	2,240	0.5	Month	$ 1,120.00
Maintenance Foreman	$	4,897	4	Month	$ 19,588.00

Heavy Equipment Operator	$ 3,042	4	Month	$ 12,168.00
Laborer	$ 2,730	2.5	Month	$ 6,825.00
Heavy Equipment Operator	$ 3,415	4	Month	$ 13,660.00
Heavy Equipment Operator	$ 2,947	4	Month	$ 11,788.00
Laborer	$ 2,600	4	Month	$ 10,400.00
Heavy Equipment Operator	$ 2,600	4	Month	$ 10,400.00
Laborer	$ 2,340	2.5	Month	$ 5,850.00
Maintenance Foreman	$ 4,065	3	Month	$ 12,195.00
Laborer	$ 1,933	3	Month	$ 5,799.00
Laborer	$ 2,210	3	Month	$ 6,630.00
Laborer	$ 2,106	3	Month	$ 6,318.00
Laborer	$ 1,889	3	Month	$ 5,667.00
Project Director	$ 9,320	0.1875	Month	$ 1,747.50
Supervisor	$ 4,096	0.1875	Month	$ 768.00
Technician	$ 3,240	0.375	Month	$ 1,215.00
Technician	$ 2,568	0.625	Month	$ 1,605.00
Technician	$ 2,568	0.225	Month	$ 577.80
Technician	$ 2,232	0.5	Month	$ 1,116.00
Fringe Benefits				
Project Director	$ 76,890.00	40%	of salary	$ 30,756.00
Project Director	$ 14,096.50	40%	of salary	$ 5,638.60
Design/Drafting Technician	$ 7,940.64	40%	of salary	$ 3,176.26
Field Survey Technician	$ 12,680.00	40%	of salary	$ 5,072.00
Field Survey Technician	$ 10,200.00	40%	of salary	$ 4,080.00
Survey/Design Technician	$ 2,890.80	40%	of salary	$ 1,156.32
Field Survey Technician	$ 10,120.00	40%	of salary	$ 4,048.00
Project Director	$ 16,698.00	40%	of salary	$ 6,679.20
Maintenance Foreman-Central	$ 36,585.00	40%	of salary	$ 14,634.00
Heavy Equipment Operator	$ 26,676.00	40%	of salary	$ 10,670.40
Heavy Equipment Operator	$ 31,041.00	40%	of salary	$ 12,416.40
Heavy Equipment Operator	$ 23,634.00	40%	of salary	$ 9,453.60
Welder	$ 6,674.00	40%	of salary	$ 2,669.60
Welder	$ 7,078.50	40%	of salary	$ 2,831.40
Laborer	$ 17,001.00	40%	of salary	$ 6,800.40
Heavy Equipment Operator	$ 23,400.00	40%	of salary	$ 9,360.00
Heavy Equipment Operator	$ 26,676.00	40%	of salary	$ 10,670.40
Welder/Laborer	$ 10,489.50	40%	of salary	$ 4,195.80
Laborer	$ 16,380.00	40%	of salary	$ 6,552.00
Laborer	$ 16,380.00	40%	of salary	$ 6,552.00
Welder/Laborer	$ 9,880.00	40%	of salary	$ 3,952.00
Heavy Equipment Operator	$ 18,720.00	40%	of salary	$ 7,488.00

Heavy Equipment Operator	$ 24,957.00	40%	of salary	$ 9,982.80
Maintenance Foreman	$ 27,904.75	40%	of salary	$ 11,161.90
Carpenter	$ 20,234.25	40%	of salary	$ 8,093.70
Carpenter	$ 19,584.50	40%	of salary	$ 7,833.80
Carpenter	$ 15,847.00	40%	of salary	$ 6,338.80
Carpenter	$ 16,393.25	40%	of salary	$ 6,557.30
Carpenter	$ 15,645.75	40%	of salary	$ 6,258.30
Carpenter	$ 7,359.00	40%	of salary	$ 2,943.60
Carpenter	$ 5,799.00	40%	of salary	$ 2,319.60
Carpenter	$ 5,799.00	40%	of salary	$ 2,319.60
Carpenter	$ 5,799.00	40%	of salary	$ 2,319.60
Carpenter	$ 5,799.00	40%	of salary	$ 2,319.60
Maintenance Foreman	$ 4,697.00	40%	of salary	$ 1,878.80
Heavy Equipment Operator	$ 1,915.50	40%	of salary	$ 766.20
Laborer	$ 2,695.00	40%	of salary	$ 1,078.00
Welder/Laborer	$ 3,007.00	40%	of salary	$ 1,202.80
Heavy Equipment Operator	$ 3,449.00	40%	of salary	$ 1,379.60
Laborer	$ 2,539.00	40%	of salary	$ 1,015.60
Laborer	$ 1,300.00	40%	of salary	$ 520.00
Laborer	$ 1,430.00	40%	of salary	$ 572.00
Heavy Equipment Operator	$ 1,120.00	40%	of salary	$ 448.00
Maintenance Foreman	$ 19,588.00	40%	of salary	$ 7,835.20
Heavy Equipment Operator	$ 12,168.00	40%	of salary	$ 4,867.20
Laborer	$ 6,825.00	40%	of salary	$ 2,730.00
Heavy Equipment Operator	$ 13,660.00	40%	of salary	$ 5,464.00
Heavy Equipment Operator	$ 11,788.00	40%	of salary	$ 4,715.20
Laborer	$ 10,400.00	40%	of salary	$ 4,160.00
Heavy Equipment Operator	$ 10,400.00	40%	of salary	$ 4,160.00
Laborer	$ 5,850.00	40%	of salary	$ 2,340.00
Maintenance Foreman	$ 12,195.00	40%	of salary	$ 4,878.00
Laborer	$ 5,799.00	40%	of salary	$ 2,319.60
Laborer	$ 6,630.00	40%	of salary	$ 2,652.00
Laborer	$ 6,318.00	40%	of salary	$ 2,527.20
Laborer	$ 5,667.00	40%	of salary	$ 2,266.80
Project Director	$ 1,747.50	40%	of salary	$ 699.00
Supervisor	$ 768.00	40%	of salary	$ 307.20
Technician	$ 1,215.00	40%	of salary	$ 486.00
Technician	$ 1,605.00	40%	of salary	$ 642.00
Technician	$ 577.80	40%	of salary	$ 231.12
Technician	$ 1,116.00	40%	of salary	$ 446.40
				$ -

Equipment						
2001 Dodge Ram 1500 1/2 Ton T50XX004	$	22.00	680	hours	$	14,960.00
CHEVY 1500 PICKUP T50XX004	$	22.00	160	hours	$	3,520.00
DODGE RAM 1500 PICKUP T50XX004	$	22.00	800	hours	$	17,600.00
DODGE RAM 4 X 4 PICKUP-1998 T50XX004	$	22.00	240	hours	$	5,280.00
IT 4 X 2 FORD CREW CAB T50XX004	$	22.00	440	hours	$	9,680.00
1994 CHEVROLET C3500 1 T DUALLY T50XX009	$	22.36	440	hours	$	9,838.40
CHEVY 3/4 T. EXT. CAB UTIL BED T50XX008	$	22.18	240	hours	$	5,323.20
CHEVROLET SILVERADO 2500 4 X 4 T50XX008	$	22.18	60	hours	$	1,330.80
CHEVROLET SILVERADO 2500 T50XX008	$	22.18	80	hours	$	1,774.40
FORD F-350 2006 WELDER/SPRAYER T50XX018	$	18.26	120	hours	$	2,191.20
BACKHOE, JD 410E L50CS008	$	35.10	80	hours	$	2,808.00
CATERPILLAR MOTOR GRADER 130G G15CA001	$	55.67	80	hours	$	4,453.60
CATERPILLAR MOTOR GRADER 130G G15CA001	$	55.67	40	hours	$	2,226.80
CATERPILLAR FORKLIFT MODEL TH560B L40CA038	$	41.61	480	hours	$	19,972.80
VOLVO EXCAVATOR EC160CL H25LB005	$	56.29	640	hours	$	36,025.60
VOLVO EXCAVATOR EC160CL H25LB005	$	56.29	160	hours	$	9,006.40
VOLVO 360 EXCAVATOR H25CS027	$	91.12	640	hours	$	58,316.80
CASE LOADER Mod CA621DBA L40CS012	$	60.34	480	hours	$	28,963.20
INTERNATIONAL DUMP TRUCK-2001 T40XX002	$	28.30	560	hours	$	15,848.00
JD 644 LOADER L40CS012	$	60.34	80	hours	$	4,827.20
INTERNATIONAL DUMP TRUCK-2001 T50XX022	$	28.30	640	hours	$	18,112.00
TANDEM DUMP TRUCK T50XX029	$	51.49	80	hours	$	4,119.20
2006 INTL 4200 WATER TRUCK 2,000 GAL T40RS001	$	7.24	640	hours	$	4,633.60
2006 INTL 4200 WATER TRUCK 2,000 GAL T40RS001	$	7.24	80	hours	$	579.20
FORD CREW CAB T50XX012	$	23.14	800	hours	$	18,512.00
CAT D5GXL DOZER T15CA022	$	45.13	640	hours	$	28,883.20
CAT D5GXL DOZER T15CA022	$	45.13	40	hours	$	1,805.20
DIESEL REVERSIBLE COMPACTOR C10WC007	$	5.71	80	hours	$	456.80
WACKER PLATE DIESEL COMPACTOR C10WC007	$	5.71	640	hours	$	3,654.40
RAMMER LARGE JUMPING JACK C10BO001	$	2.81	1280	hours	$	3,596.80
RAMMER LARGE JUMPING JACK C10BO001	$	2.81	1280	hours	$	3,596.80

USED RIDE ON ROLLER COMPACTOR R50CA014	$ 47.95	480	hours	$ 23,016.00
CAT 621F WATER BUFFALO T60CA002	$ 159.34	480	hours	$ 76,483.20
Supplies and Materials				
High-flow Low-lift Pump	$ 25,708.60	6	each	$ 154,251.60
CD120-4S DI RTU with LCD display	$ 2,274.00	9	each	$ 20,466.00
SP20 20 watt solar panel and bracket	$ 225.00	9	each	$ 2,025.00
Yagi Antenna. 5 element	$ 269.00	9	each	$ 2,421.00
Metal Magmeters	$ 1,744.00	6	each	$ 10,464.00
NEMA 4 Enclosure SNG-3731	$ 136.35	9	each	$ 1,227.15
Aluminum Pedestals	$ 170.80	9	each	$ 1,537.20
Greyline Bigfoot A1 Velocity Sensor	$ 1,445.00	10	each	$ 14,450.00
24" x 20' 80 PSI irrigation Pipe	$ 27.24	7300	each	$ 198,873.90
24" steel pipe Sch 40 IPS	$ 70.00	300	each	$ 21,000.00
24" Butterfly valve & weld on flange	$ 2,307.69	4	each	$ 9,230.77
24" 45 degree 80# PIP bends	$ 796.00	11	each	$ 8,756.00
24" 45 degree Sch 40 steep pipe bends	$ 280.00	10	each	$ 2,800.00
24" metal Sch 40 pipe weld on flange	$ 125.30	4	each	$ 501.20
24" 80# PIP glue on flange	$ 1,425.79	4	each	$ 5,703.15
18" x 20' 80 PSI irrigation Pipe	$ 16.84	4200	each	$ 70,716.24
18" steel pipe Sch 40 IPS	$ 56.00	300	each	$ 16,800.00
18" 45 degree 80# PIP bends	$ 142.64	6	each	$ 855.86
18" 45 degree Sch 40 steep pipe bends	$ 245.00	11	each	$ 2,695.00
18" metal Sch 40 pipe weld on flange	$ 99.55	4	each	$ 398.22
18" 80# PIP glue on flange	$ 621.87	4	each	$ 2,487.50
Ultra Flo Pipe 36" x 30'	$ 1,020.00	187	each	$ 190,740.00
Ultra Flo Pipe 48" x 30'	$ 1,320.00	132	each	$ 174,240.00
Ultra Flo Pipe 48" x 20'	$ 880.00	121	each	$ 106,480.00
Helcore Pipe 18" x 24'	$ 408.00	68	each	$ 27,744.00
Helcore Pipe 36" x 24'	$ 744.00	7	each	$ 5,208.00
CMP Tee 48" 48" x 30' x 36"	$ 1,722.00	20	each	$ 34,440.00
CMP Tee 48" 48" x 30' x 18"	$ 1,674.00	68	each	$ 113,832.00
CMP Tee 36" x 30' x 3'	$ 1,298.00	15	each	$ 19,470.00
CMP Elbow 18"	$ 234.00	68	each	$ 15,912.00
CMP Elbow 36"	$ 597.00	1	each	$ 597.00
CMP Elbow 36" double mitered bend	$ 791.59	1	each	$ 791.59
Ultra Flo Pipe 48" x 1'	$ 44.00	4	each	$ 176.00
Ultra Flo Pipe 36" x 2'	$ 34.00	16	each	$ 544.00
Ultra Flo Pipe 36" x 1'	$ 34.00	2	each	$ 68.00
CSP BD 5-C RVTD 18" (pipe connectors)	$ 32.00	136	each	$ 4,352.00
CSP BD 5-C RVTD 36" (pipe connectors)	$ 58.00	208	each	$ 12,064.00

CSP BD 5-C RVTD 48" (pipe connectors)	$ 80.00	340	each	$ 27,200.00
Band ACC Flat Gasket 18"	$ 20.00	136	each	$ 2,720.00
Band ACC Flat Gasket 36"	$ 56.00	208	each	$ 11,648.00
Band ACC Flat Gasket 48"	$ 78.00	340	each	$ 26,520.00
Freight and Sales Tax pipe			total	$ 134,100.21
Check Box	$ 6,559.76	6	each	$ 39,358.56
Distribution Box	$ 4,136.27	3	each	$ 12,408.81
Pump Box	$ 52,345.00	2	each	$ 104,690.00
Turnout 48"	$ 4,087.49	7	each	$ 28,612.43
Turnout 36"	$ 1,621.20	10	each	$ 16,212.00
Pedestals-Solar Panel Array	$ 3,350.00	12	each	$ 40,200.00
Contractual/Construction				
Solar Panel Supplier/Installer	$ 70,224.00	2	each	$ 140,448.00
EL Paso Electric connection WW13	$ 42,000.00	1	each	$ 42,000.00
EL Paso Electric connection WW19	$ 84,259.00	1	each	$ 84,259.00
LE Electric		3	total	$ 137,781.91
Third-party Contributions – N/A				$ -
Other				
Environmental compliance	$ 2,500.00		total	$ 2,500.00
TOTAL DIRECT COSTS				$ 3,595,983.22
Indirect Costs – N/A				$ -
TOTAL ESTIMATED PROJECT COSTS				**$ 3,595,983.22**

Table 8: Contribution Breakdown

Budget Category Totals	Federal Request	EBID Contribution
Salaries and Wages	$ -	$ 749,722.24
Fringe Benefits	$ -	$ 299,888.90
Equipment	$ -	$ 441,394.80
Supplies and Materials	$ 1,697,988.38	$ -
Contractual/Construction	$ 84,259.00	$ 320,229.91
Other	$ -	$ 2,500.00
Contribution breakdown	49.56%	50.44%

2.3. Budget Narrative

Project Manager for this proposed project will be Gary Esslinger, EBID's Treasurer/Manager. Construction will be performed by EBID personnel under the Leo Barrett, Maintenance Projects Director. Procurement, financial accounting, and grant administration will be performed by Gail Norvell, EBID Finance Director. Design will be completed by EBID personnel under the direction

and supervision of Zachary Libbin, PE, District Engineer, as well as construction surveying and additional construction site observation. Installation of metering and RTUs will be performed by EBID personnel under the direction of Patrick Lopez, EBID SCADA Systems Director. Gail Norvell, Leo Barret, Zachary Libbin, and Patrick Lopez will also serve as essential Assistant Project Managers.

Required personnel are listed within the Budget Proposal above within Table 9. Names of employees have not been included, only maintenance season position titles. Many of EBID's maintenance season construction personnel are cross-trained for construction in addition to their water season patrolman duties. Salaries and wages, estimated hours, and rate of compensation are included. EBID certifies that the labor rates included in the budget proposal represent actual labor rates of the identified personnel and are consistently applied to Federal and non-Federal activities.

All labor required for the execution of this project will be carried out by EBID staff, middle managers, and EBID labor force. The total cost of labor is derived from the current pay scales of EBID employees. The Davis-Bacon Wage determinations do not apply to this grant, as no contracted labor is used on this project.

Time for working with the Bureau of Reclamation to achieve NEPA compliance documentation and compliance with reporting requirements, including final project report and evaluation was estimated to require 20 hours of Project Manager-District Engineer and Project Engineer each.

Fringe benefits for the employees assigned to this project are 40 percent of wages. This fringe is derived from the actual costs for personnel at EBID. The fringe benefit package includes medical, dental, vision, short- and long-term disability, life insurance, retirement, annual leave, sick leave, holiday leave, and FICA workmen's compensation and unemployment insurance.

No travel will be required as part of the proposed project.

Heavy equipment and vehicles required to complete this project are owned by EBID. Equipment hourly rates are derived from Army Corps of Engineers Construction Equipment Ownership and Operating Expense Schedule.

Six high-flow, low-lift axial flow pumps and associated motors are required to pump surface water from the wasteways. The costs are determined by quotes from applicable vendors providing these materials.

All other materials and supplies shown above will be used for this project are required to pipe the canals and improve conservation and metering of the pipeline flows. The costs are determined by quotes received from applicable vendors providing these materials except for the check box, distribution box, pump box, and solar pedestal components which were estimated based upon tabulations of materials costs for components of recent similar projects.

An 18-kW solar panel array and associated electrical hardware, including inverters, wiring, and mounting hardware, will be supplied by a licensed installer. The prices are determined by quotes received from applicable vendors providing these materials and recent purchases of similar equipment.

The required connections to the El Paso Electric power grid and required extension of three-phase power (at both Wasteway 13 and Wasteway 19) is budgeted based on a written estimate provided by an El Paso Electric service planner. The extension of these lines is not avoidable to be able to power the proposed, large pumps.

An electrical contractor will be required to complete the connection between the pumps and El Paso Electric power grid as well as connecting the solar panel arrays to the power grid at both component locations of the project. Electrical components provided and installed by a licensed electrician include conduit, wiring, electrical panels and enclosures, and variable frequency drives.

Procurement for these services and materials are per State of New Mexico Procurement Regulations and will be completed by competitive bids or formal RFP and/or existing contracts for these services and materials currently approved and established.

Expected costs of environmental compliance required for preparation of environmental compliance documentation applicable to the requested federal funding was estimated by the environmental compliance staff of the Albuquerque office of the Bureau of Reclamation through Woody Irving, Planning Engineer, Bureau of Reclamation, El Paso Field Division. This estimate is based upon a summary provided while preparing this response to the Funding Opportunity Announcement.

3. Environmental and Cultural Resources Compliance

EBID's water delivery system was constructed by the Bureau of Reclamation as part of the Rio Grande Project. By piping the 7,580 feet of the tail end of the California Lateral and 5,960 feet of the California Extension all structures will be replaced, and the design will be modified in coordination with the farmers in the area.

EBID has extensive experience with all aspects of the project and surrounding areas. The project will not be a detriment to the surrounding environment, but rather an enhancement. Earth disturbing activities include installing metal pipe, plastic irrigation pipe, concrete box structures for pumps, concrete canal distribution structures, and the foundations for solar panel arrays. Efforts will be taken to reduce effects to air and water quality, including water trucks constantly on site for dust control and suspending work on windy days or days with noteworthy precipitation. The areas surrounding the California Lateral, California Extension, and Wasteway 19 are entirely farmland or IBWC levee. This ground disturbance will only take place within EBID property extents and limited to excavation, installation, and backfill of the piping and associated concrete structures. No detriment to the surrounding environment is expected. EBID is not aware of any species listed, or proposed to be listed, as a federally threatened or endangered species or as a designated critical habitat within the project area. This understanding was also verified by USFWS information available online.

EBID is not aware of any wetlands or of other surface waters inside the project boundaries that qualify as "Waters of the United States" besides the construction of the pump box required for Revitalizing the Three Saints Main Canal at Wasteway 19 near the levee and within the overbank of the Rio Grande. Appropriate consultation with IBWC, who manage the Rio Grande, will be required prior to construction of the structure within EBID's Wasteway 19 that is located within the IBWC's levee. EBID is not aware of any archeological or Native American sacred sites within the project area. This project will not limit access to any sites, sacred or otherwise, and will not have any negative impact on low income or minority populations.

EBID's system was constructed by the Bureau of Reclamation as part of the Rio Grande Project in the early 1900's. Although exact dates for construction of these canals is not readily available, it is known that much of EBID's canal system was constructed by the Bureau of Reclamation following contracting in 1917-1918. EBID's facilities are designated as a historically significant resource. As a result, EBID routinely works with the State Historical Preservation Office (SHPO) before any action is taken. The canals and drains are not sensitive, and EBID is not aware of any structures that are assigned historical significance. A search of the Archaeological Records Management Section at New Mexico Historical Preservation Division and a cultural resource survey for California Lateral, California Extension, Three Saints Main Canal, and Wasteway 19 improvements will be contracted or performed by the Bureau of Reclamation. Besides the California Lateral, California Extension, Three Saints Main Canal, and Wasteway 19, and requisite coordination with New Mexico State Historical Preservation Office, no other sites, archaeological or otherwise, buildings or structures are anticipated which would require coordination with the Historical Cultural Property Inventory.

4. Required Permits and Approvals

The entire project proposed will be located on property owned by EBID with the exception of the construction of the pump box required for Revitalizing the Three Saints Main Canal at Wasteway 19 within the overbank of the Rio Grande near the river levee. EBID has a right to operate and maintain all wasteways including within the Rio Grande levee system as they were constructed prior to IBWC canalization and incorporated into construction of the river levee. Although additional permitting is not expected, appropriate consultation with IBWC, who manage the Rio Grande and its levees, will be required prior to construction of the structure within EBID's Wasteway 19 that is located within the IBWC's levee.

The solar power generated by this project will be marketed to El Paso Electric Co., the regional provider in the EBID area. EBID has worked with El Paso Electric with small-scale hydroelectric power and one previous connection of a solar panel array. EBID will build on that relationship to market the solar power produced here as an offset to the power required by the pumps proposed. El Paso Electric will coordinate any permitting or easements required for connection of electrical power to the pumps proposed at Wasteway 13 and Wasteway 19. Both connections of power are expected to follow EBID property to the project sites.

The new delivery from EBID's wasteway, which are connected to the Rio Grande, via the proposed high-flow, low-lift pumps will be coordinated with El Paso County Water Improvement District #1 and Bureau of Reclamation Albuquerque Office for accounting and measurement of diversions. The delivery of water by these pumps will be accounted for as part of EBID's total diversion at Leasburg and Mesilla Dams.

5. Letters of Support

CONGRESS OF THE UNITED STATES

DELEGATION OFFICE
STATE OF NEW MEXICO
HART SENATE OFFICE BUILDING
WASHINGTON, D.C. 20510
(202) 224 - 8962

September 17, 2020

Brenda Burman, Commissioner
Bureau of Reclamation
1849 C Street NW
Washington, DC 20240-0001

Dear Commissioner Burman:

The New Mexico Congressional Delegation writes in support of the application submitted by the Elephant Butte Irrigation District for a WaterSMART Water and Energy Efficiency Grant as funded by the Bureau of Reclamation. This grant, BOR-DO-21-F001, will allow the Elephant Butte Irrigation District (EBID) to develop a surface water efficiency plan to conserve the District's water resources.

EBID is an irrigation district in southern New Mexico that has facilitated the delivery of water to communities in Sierra and Doña Ana counties for over 95 years. The current EBID WaterSMART proposal seeks to conserve surface water along the portions of the Rio Grande River within its jurisdiction by achieving significant reductions in conveyances losses and increasing on-farm water efficiency.

Specifically, EBID proposes to replace a portion of its earthen canals with water transportation piping and to install a series of solar-powered water pumps to reduce the amount of water lost to seepage and improve water delivery speeds for EBID's customers. This project will also incorporate magnetic flow and Doppler velocity sensors at key points along EBID's waterways to generate new data that will inform the District's water delivery efforts.

EBID projects that the resulting reduction in seepage and conveyance losses coupled with improved irrigation efficiency will conserve over 7,300 acre-feet of water per year, or

approximately six percent of EBID's 15-year average allotment conserved each year. We believe that this project will result in water delivery efficiencies for EBID's customers and we commend the District for its continued efforts to reduce the impact of drought conditions on southern New Mexico's water resources.

The New Mexico Congressional Delegation proudly supports the application submitted by the Elephant Butte Irrigation District for a WaterSMART Water and Energy Efficiency Grant as funded by the Bureau of Reclamation and we request that you give their application thorough consideration within your agency's guidelines.

Sincerely,

/s/ Tom Udall
United States Senator

/s/ Xochitl Torres Small
United States Representative

/s/ Martin Heinrich
United States Senator

/s/ Ben Ray Luján
United States Representative

/s/ Deb Haaland
United States Representative

Letter of Cost Share Contribution and Commitment
for Elephant Butte Irrigation District WaterSMART Grant Application FY 2021

DORMAC LLC
McCilli Farm LLP
Salopek Foundation

As producers and members of the Elephant Butte Irrigation District (EBID) we agree and support the proposed project and BOR WaterSMART Grant proposal titled "Delivering Conservation: Renovating Efficient Access to Rio Grande Project Surface Water for the Mesilla Valley."

We agree and commit to provide a portion of the cost-share of the proposed project, specifically the contribution of $140,000 towards the materials required to revitalize the Three Saints Main Canal and Wasteway 19.

The cash contributions are to be contributed to the Elephant Butte Irrigation District towards this conservation project if selected for funding. We agree and commit that all match contributions will be transferred during the grant period if the proposal is selected for funding. We agree and commit that all match contributions are currently available for transfer to EBID and will be transferred during the first year of the grant period, no later than October 1, 2022, if selected.

It is understood that this contribution is provided to support and leverage funding required to improve EBID infrastructure, of which we will have no ownership. The benefit to DORMAC LLC, McCilli Farm LLP, and Salopek Foundation, if the project is selected, will be conservation of water which will increase the supply of all EBID members pro-rata as well as increased potential for on-farm conservation.

We encourage the energy conscious water conservation proposed by EBID's WaterSMART grant application and request that the Bureau of Reclamation fund the collection of conservation projects proposed.

Business Names Signatory Names	Signatory Contact Information	Signature
DORMAC LLC	Mike McNamee	
McCilli Farms LLP	Mike McNamee	
Salopek Foundation	James Salopek Rett Salopek	

Letter of Cost Share Contribution and Commitment
for Elephant Butte Irrigation District WaterSMART Grant Application FY 2021

Stahmanns Inc

As a producer and a member of the Elephant Butte Irrigation District (EBID) we agree and support the proposed project and BOR WaterSMART Grant proposal titled "Delivering Conservation: Renovating Efficient Access to Rio Grande Project Surface Water for the Mesilla Valley."

We agree and commit to provide a portion of the cost-share of the proposed project, specifically the contribution of $200,000 towards the materials required to modernize the California Lateral and Extension.

We also agree to an exchange of land to realign the California Lateral, within Section 2 of Township 24 South Range 1 East, as shown approximately on the attached map. We agree to exchange a Quit Claim Deed for a new 40 feet wide alignment of the California Lateral for a portion of the existing EBID Right of Way of the California Lateral. The new alignment will comprise a total acreage of roughly 2.72 acres plus or minus in exchange for EBID relinquishing roughly 2.54 acres plus or minus.

The cash contribution and easement are to be contributed to the Elephant Butte Irrigation District towards this conservation project if selected for funding. We agree and commit that all match contributions will be transferred during the grant period, if the proposal is selected for funding. We agree and commit that all match contributions are currently available for transfer to EBID and will be transferred during the first year of the grant period, no later than October 1, 2022, if selected. Land exchange documents and plat will be finalized within the first year following the date the project is funded.

It is understood that this contribution is provided to support and leverage funding required to improve EBID infrastructure, of which we will have no ownership. The benefit to Stahmanns Inc., if the project is selected, will be conservation of water which will increase the supply of all EBID members pro-rata as well as increased potential for on-farm conservation.

We encourage the energy conscious water conservation proposed by EBID's WaterSMART grant application and request that the Bureau of Reclamation fund the collection of conservation projects proposed.

Signatory Names	Signatory Contact Information	Signature
Sally Stahmann Solis	575.636.3093 sally@stahmanns.com	Sally Stahmann Solis

September 14, 2020

Bureau of Reclamation
Financial Assistance Operations
Attn: Mr. Ned Weakland
P.O. Box 25007 MS: 84-27815
Denver, CO 80225

Dear Mr. Weakland,

On behalf of Stahmanns Inc., I am writing to state our intentions for ongoing and future on-farm improvements that will be complimented by Elephant Butte Irrigation District's planned project, titled "Delivering Conservation: Renovating Efficient Access to Rio Grande Project Surface Water for the Mesilla Valley," and are eligible for NRCS assistance.

This project will assist with our current sprinkler and drip irrigation systems by providing more reliable, consistent, and timely water supply due to the planned pump installations. The project will further assist our future on-farm improvements that include incorporating additional sprinkler and drip irrigation systems within our pecan orchard.

Stahmanns Inc. has intentions of applying for financial assistance from the NRCS through programs such as the Environmental Quality Incentives Program (EQIP). These future on-farm improvements meet the EQIP requirement of addressing conservation of ground and surface water by delivering water more efficiently to our pecan trees. EBID's proposed project compliments our on-farm improvements by improving timing, improving delivery flow, and improving head pressure due to the piping of the lateral that services our farm, the California Lateral, and the installation of the planned pump system that feeds directly from the Rio Grande to the California Lateral.

We support EBID's project as it will complement our own on-farm improvements. Once EBID's project is selected for funding through the Bureau of Reclamation's WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2021, Stahmanns Inc. will be in a more advantageous position to move forward with our on-farm improvements which are eligible for NRCS assistance.

Sincerely,

Sally Stahmann Solis
CEO/President

Stahmanns Inc.
Phone: 575-526-2453 Fax: 575-528-6800
Mailing Address: PO Box 70 San Miguel, NM 88058
Physical Address: 22500 S Hwy 28 La Mesa, NM 88044

6. Official Resolution

STATE OF NEW MEXICO

ELEPHANT BUTTE IRRIGATION DISTRICT
Resolution No. 2020-03

RE: Resolution Authorizing Grant Agreement with United States Bureau of Reclamation WaterSmart Grant 2021: WaterSMART Water and Energy Efficiency Grant BOR-DO-21-F001

WHEREAS, the Governing Body of the Elephant Butte Irrigation District, State of New Mexico shall enter into a Grant Agreement with the United States Bureau of Reclamation, and,

WHEREAS, the grant opportunity is United States Bureau of Reclamation WaterSmart Grant 2021,WaterSMART Water and Energy Efficiency Grant BOR-DO-21-F001.

NOW, THEREFORE, BE IT HEREBY RESOLVED that the Governing Body of the Elephant Butte Irrigation District, State of New Mexico hereby supports the application and is capable of providing the amount of funding and/or in-kind contributions specified in the grant program at 50% or more of the total project costs as required. The total funding provided by the grant is not to exceed $2,000,000.00. Elephant Butte Irrigation District will work with the Bureau of Reclamation to meet established deadlines for entering into a grant or cooperative agreement

RESOLVED: In session this 9th day of September, 2020.

GOVERNING BODY OF ELEPHANT BUTTE IRRIGATION DISTRICT, NEW MEXICO.

Michael McNamee, President

Robert Sloan, Vice President

Gail E. Norvell
Notary Public
Commission Expires: 12/20/2022

7. References

Al-Haddad, S. (2005). *Estimating Seepage from Irrigation Canals in the Elephant Butte Irrigation District, New Mexico* (thesis).

Mays, L. W. (2001). Water Withdrawals and Uses: Water for Agriculture. In *Water Resources Engineering* (1st ed., pp. 365–366). John Wiley & Sons, Inc.

Wilson, B. C., Lucero, A. A., Romero, J. T., and Romero, P. J. (2003). *Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 2000* (Report No. 51). New Mexico Office of the State Engineer.