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WHEN:

Water – Habitat – Energy Nexus

Multi-Objective Water Conservation
WaterSMART Grant Application

Elephant Butte Irrigation District
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Doña Ana and Sierra Counties, NM

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1. Technical Proposal

1.1. Executive Summary

January 17, 2013
Elephant Butte Irrigation District, Doña Ana and Sierra Counties, New Mexico
Main offices in Las Cruces, New Mexico

Elephant Butte Irrigation District proposes an integrated set of water conservation, habitat management, and energy production practices that strive to increase efficiency of water delivered to constituent farmers by reducing losses and improving delivery timeliness, enhance riparian habitat and water quality, and partially offset increased energy requirements. The five major components of the project are:

1) Pipe 12,830 feet of the tail end of the Rincon Lateral, which is at the tail end of the Rincon Valley irrigation system, to reduce seepage and improve delivery to constituent farmers. The water saved by this projects conservation measures will benefit all EBID constituents equally, similar to any increase in efficiency. Funding is requested for the metal pipe and concrete structures, and other materials to pipe the lateral.

2) Install two high flow lift pumps from EBID's Wasteway 18, which is connected hydraulically to the Rio Grande via an existing box culvert, into the Rincon Lateral to greatly improve delivery timing and reduce canal seepage. Seepage will be reduced by transporting this irrigation water within Rio Grande channel in conjunction with irrigation water being delivered to EBID's Mesilla Valley and other downstream constituents, rather than down the 33 miles of unlined earthen canal required to reach this important part of the Rincon Valley. Water pumped at this location will be metered and will be accounted as part of the diversion for the Rincon Valley at Percha Dam. Funding is requested for the two low-lift, high-flow pumps and concrete structure required.

3) Widen the Rincon Drain to create Tonuco Pond which will be designed to benefit wildlife and to mitigate groundwater salinity issues in the area. The widened Rincon Drain will serve as a wetland and by incorporating a delivery system to irrigate selected native riparian vegetation, providing suitable habitat for the currently listed endangered Southwest Willow Fly Catcher species and candidate species under consideration for listing in the area. A low lift pump with solar power will improve drain circulation (groundwater) and pond water quality. Funding is requested for a portion of the labor to widen the drain, the requisite earth moving equipment rental, design consultants, the pump and associated solar panel, and plant materials for establishing native riparian vegetation. The land required for this drain to be widened is being donated by an EBID constituent as a cost share.

4) Two nearby problematic arroyos will be channeled to discharge into the Rincon Drain to provide increased water to the Rincon Drain and Tonuco Pond, and solve flooding issues. Funding is requested for the labor and equipment rental required to construct the engineered channel and the materials required for the concrete apron where the arroyo will discharge to the Rincon Drain. An easement will be given to EBID to operate and maintain the channel and the value of the easement has been included as part of the cost share.

5) A photovoltaic solar panel array will be installed to partially offset the electricity of the high flow lift pumps proposed by this project. The solar array will be installed within the existing right of way of the Rincon Lateral after the lateral is piped. The electricity produced by the panels will be sold to the local electric utility, and the lift pumps will be powered with electricity purchased from the same utility.

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 or land which is being contributed to the project by EBID constituent farmers. Letters of commitment have been signed and included for the land and easement being contributed.

The project will take three years to complete. If the project begins in October 2014, the anticipated completion date would be September 30, 2017.

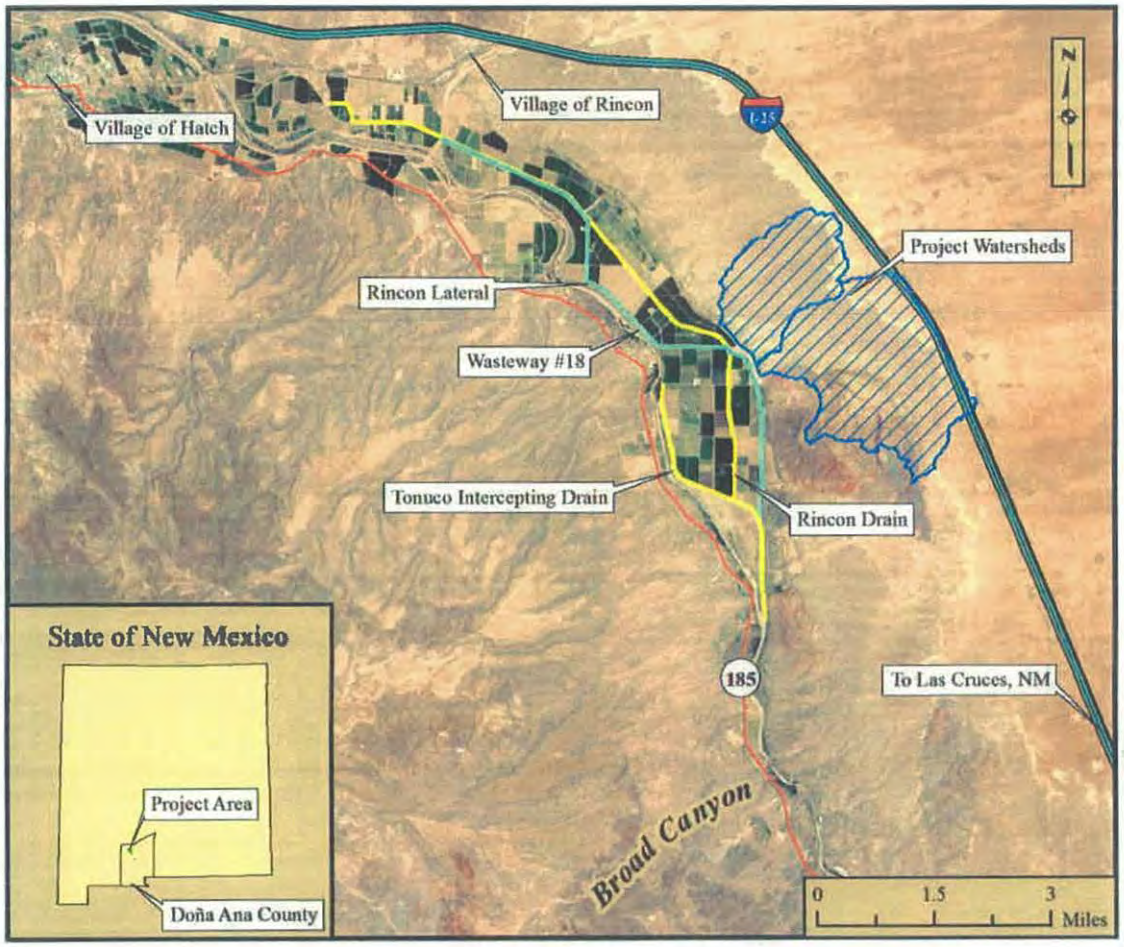

Figure 1. Project Location Map.

1.2. Background Data

1.2.1. The Rio Grande Project: Elephant Butte Irrigation District (EBID) is the New Mexico portion of the Rio Grande Project (RGP), which 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 344 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;
- The Republic of Mexico 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 is a legislatively authorized political subdivision of the State of New Mexico. The district operates under New Mexico statutes §73-10-1 through §73-10-47, Irrigation District Cooperating with United States under Reclamation Laws; Formation and Management, and §73-11-1 through §73-11-55 Irrigation Districts Cooperating with United States under Reclamation Laws; Fiscal Affairs; Local Improvements and Special Powers. As defined by New Mexico statutes, irrigation districts cooperate with the federal government on Bureau of Reclamation projects. These statutes generally state that irrigation districts are to:

- Serve as a contracting agency for water users to arrange to repay construction obligations to the government and furnish funds for operation and maintenance; and in connection with other matters that must be agreed to, in contract for, between the government and water users. (§73-10-1 paraphrase)
- Serve as an agency for the assessment and collection of operation, maintenance and construction charges and the payment of same, to the government in accordance with contractual arrangements. (§73-11-28 paraphrase)
- Provide a water users' organization that might later be expanded for the purpose of assuming control of operation and maintenance upon transfer by the Bureau of Reclamation. (§73-10-45 paraphrase)

EBID is governed by a board of nine elected members drawn from the district's constituents. The board meets monthly and has broad powers to set policies, which are implemented by district personnel, who are overseen by the District Manager.

1.2.2. Physical facilities: Elephant Butte Irrigation District's lands 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 13 operational units that are manned by ditch riders. Only about 27 miles of the laterals are currently in pipe. The district also has about 300 miles of drains that return subsurface drainage and storm water to the Rio Grande. Reclamation retains title to the diversion dams, and EBID operates and maintains them under contract with Reclamation. EBID owns the canal and drainage systems, along with associated land.

1.2.3. Hydrology and Water Supply: Water 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, accounting for gains or losses in the system and lag times to the diversion points. Each district and Mexico has 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.

A "full allocation" for annual diversion to EBID is about 495,000 acre-feet. EBID has not had a full allocation since 2002 due to the persistent and increasingly severe drought in the area. The RCP 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 1 of every year. Having occurred for 24 consecutive years, full supply came to be considered a normal year. It is not. The last twelve 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 1979-2002, with a three-foot allotment every year, the conveyance efficiency was about 65 percent. Of the 35 percent loss, about ten percent was attributed to losses in the main canal system and 25 percent was attributed to losses in the laterals.

In the twelve years since 2002, the allotment has only been full once, in 2005. In 2003 and 2004, the allotment was only eight inches. In 2011, it was four inches, and in 2012 it was ten inches. The year 2013 saw the worst water supply in the nearly 100 year history of the Rio Grande Project, with an allotment to farmers of only 3.5 inches. Since a significant portion of the losses are fixed, 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. The short supply compounded by higher relative losses makes drought particularly painful in EBID, and this has been much of the motivation for this project.

1.2.4. EBID Constituents: EBID remains an agricultural water provider. About four percent of the district's water righted acreage is in parcels of less than two acres, known as small tract irrigators, operating on a fixed rotation that is scheduled based on available water. The other 96 percent is classified as farm rate, and those constituents schedule and order water on a demand basis.

The City of Las Cruces (CLC) holds about 1500 acres of EBID water rights. They acquired these water rights as a Special Water Users Association (SWUA). The statutory basis for the SWUA was jointly developed by EBID, CLC, and the New Mexico Office of the State Engineer to facilitate the transfer of agricultural surface water to municipal use. Unfortunately, the decade of drought has prevented CLC from developing the surface water treatment capacity to use the water, and until they do, the water allotted to CLC is leased on an annual basis to irrigators. Therefore, EBID has no current uses other than irrigation.

1.2.5. Past work with Reclamation: EBID has worked on several projects with Reclamation, including three projects in the Water 2025 Challenge Grant program in 2004. One of those projects was in partnership with El Paso Water Utilities to improve monitoring water quality in the Rio Grande Project. Another was in partnership with the City of Las Cruces, to develop regulating retention capacity on one of the City's storm water ponds. The third implemented various water conservation pilot projects, including drip and sprinkler irrigation using surface water. A summary of previous work carried out by EBID with Reclamation funding is presented below in Table 1.

Program	Grant No.	Year started	Amount
Challenge Grant 2025-EBID	05-FC-40-2394	2004	$300,000
Challenge Grant 2025-EP	05-FC-40-2392	2004	$154,675
Energy and Water Development Appropriation Act	06-FC-40-2541	2006	$1,651,500
BOR Remote Sensing	08-FC-40-2799	2008	$239,354
BOR Irrigation Management System	R12AP40019	2012	$80,000

Table 1: Previous EBID grants from Reclamation.

EBID is also currently a co-defendant with Reclamation in New Mexico v. Bureau of Reclamation, EBID, and EPCWID in US district court. In the suit, the New Mexico District Attorney seeks, among other things, to dictate Reclamation's accounting procedures for Rio Grande Compact Credit Water stored in Elephant Butte Reservoir and to overturn the 2008 Operating Agreement negotiated by the two districts and Reclamation.

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 much 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, and 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. The District 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 mainstem of the Rio Grande at three principal diversion points: Percha Dam just below the release point of Caballo Dam and at the head of 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 irrigation the lower two thirds of the Mesilla Valley.

The southern end of the Rincon system is particularly problematic. Its tail-endedness 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 Hatch and Rincon area during the century since the canal system was built. Bypass surgery is the logical solution.

In 2013, EBID 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 system. The pump installation on the Eastside Canal is shown below in Figure 1. The tail-enders of the Leasburg system are very close to the heading of the Mesilla 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, and the equity of EBID's delivery system increased substantially. Farmers participating in the project received improved flow rate 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. The water thus conserved was distributed through the allocation/allotment system to all of the constituents of EBID.

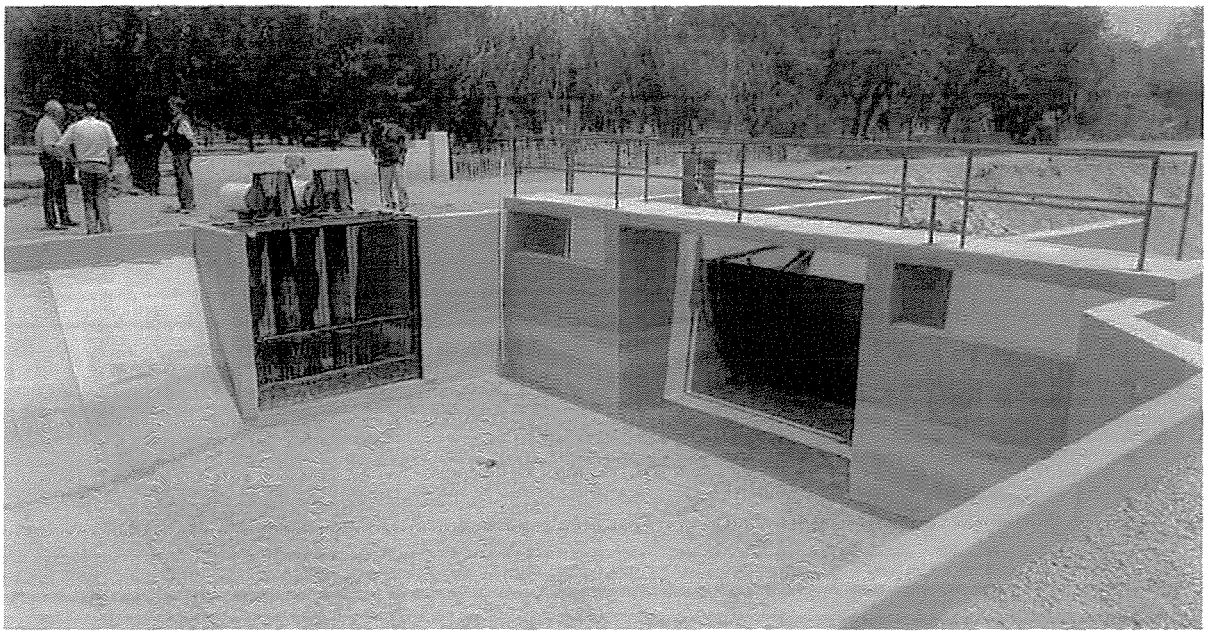

Figure 2: Lift pump on the Eastside Canal conveying water from the head of the Mesilla Dam diversion to the tail end of the Leasburg system.

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.

Figure 3: The Kerr Lateral, which has been placed in pipe.

1.3.2. Pipeline Project: 12,830 feet (2.43 miles) of EBID's Rincon Lateral will be converted from an open, earthen lined channel to an aluminized steel pipeline with concrete check and diversion boxes. The Rincon Lateral is strategically targeted because it is located at the tail end of the Rincon Valley and has both major operational difficulties and great potential water delivery and efficiency improvements. Pipeline projects benefit EBID and its farmers in various ways including reduced seepage, reduced hydraulic roughness allowing for less head loss along each canal, reduced weed problems, 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 tail end of the Rincon Valley operating area suffers because it is difficult and inefficient to deliver surface water from its river diversion which is 33.4 miles upstream at Percha Dam, causing greater system losses that affect the available on-farm water supply for all of EBID's members. By piping the lateral, the seepage and other operating losses are virtually eliminated and the chance of breaches in the canal banks eliminated. Farmers in the project service area also benefit when conveying groundwater that they pump into the system. The virtual elimination of seepage reduces the amount of water they need to pump for a given farm delivery and increase the delivery flow rate. These improvements reduce the amount of water

pumped, and reduce the energy consumed by that pumping. Improved metering equipment will be installed at the beginning of the pipeline, after Wasteway 18 where pumps are proposed to be installed, and at the end of the proposed pipeline downstream of the last farm diversion and upstream of the wasteway which will all water to be diverted to the Rincon Drain.

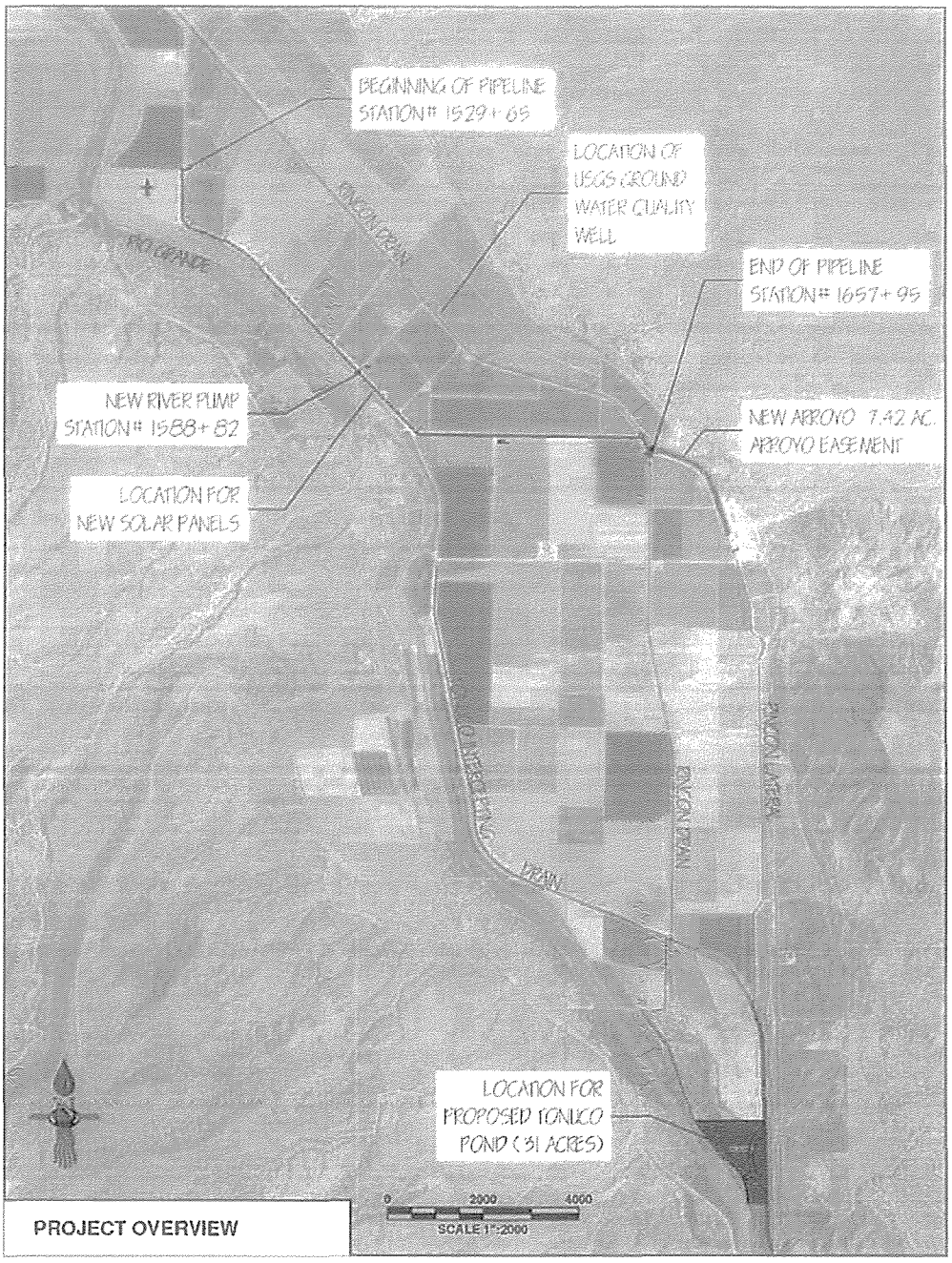

Figure 4. Project overview map

Preliminary designs and aerials showing project delivery details can be found as an attached appendix. Figure 4 shows the Project components and the extents of the pipeline.

1.3.3. River Pumps: Two high-volume, low-lift pumps into the Rio Grande at EBID's Wasteway 18 will greatly improve the timeliness, reliability, and efficiency of farm deliveries of water orders for the users along the tail end of the Rincon Valley system. By supplying the demand of the Rincon Lateral directly from the Rio Grande, less water will be lost to the inefficiencies of the canal system (approximately 50%) by avoiding the 33.4 miles of unlined canal required to transport the water from the Percha Dam diversion. With this plan, more water will remain in the Rio Grande between Percha Dam and the new supply point at Wasteway 18, and the decrease in losses will be shared as part of a larger allocation for all EBID members. Improved delivery timeliness will improve EBID cooperation with farmer irrigation scheduling and therefore improved 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 Rincon Valley but by all users throughout the Valleys operating system 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 to farmers upstream of the project area as main canal capacity is freed up, and farmers in the project area will also receive higher flow rates as their deliveries do not have to run the gauntlet of the upper system. Increased delivery flow rate is key to on-farm efficiency using improved surface irrigation methods. Figure 5 shows the area and acres of farm land which will directly benefit from the improved delivery timing of the proposed pumps.

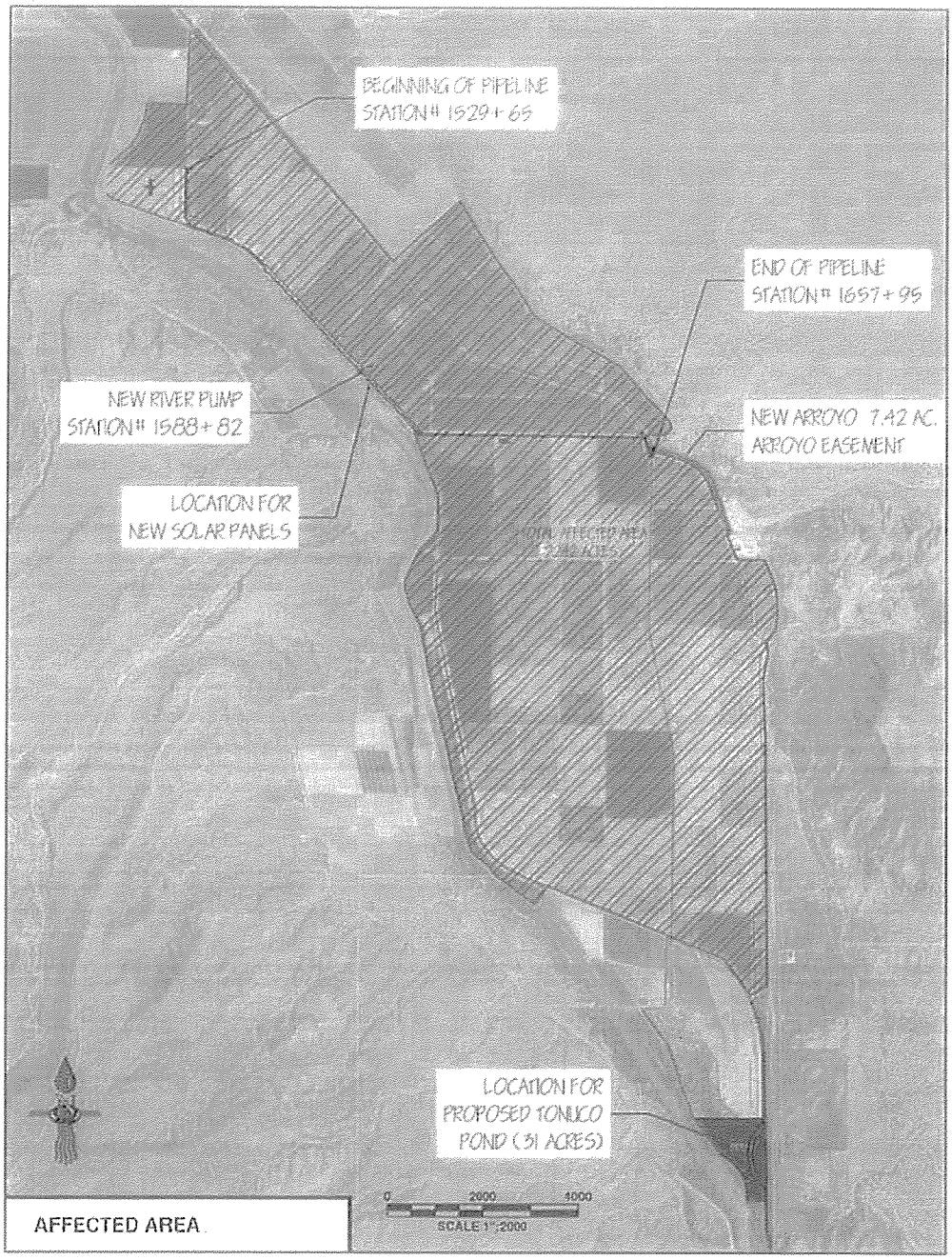

Figure 5. Acres benefiting directly from additional diversion

1.3.4. Storm water and groundwater drainage improvements - Tonuco Pond: The Rincon Drain, south of its intersection with the Tonuco Intercepting Drain, runs alongside land owned by Mr. Joe Paul Lack. Mr. Lack has managed this land with both grazing and wildlife in mind. Many migratory birds frequent this area. Just south of where Mr. Lack's property ends is an area that the US Fish and Wildlife Service is considering as a potential designated wetland. The proximity of EBID's irrigation system drain allows EBID the opportunity improve the riparian habitat along

this section of the Rio Grande Flyway, a major migratory path for several bird species, while improving groundwater salinity problems in the vicinity. The drain system, part of the Rio Grande Project, was designed and constructed by the Bureau of Reclamation, and included the Tonuco Intercepting Drain and the Rincon Drain to counteract the effects of irrigation which caused groundwater levels to rise the point that it was detrimental to the farmland. EBID owns the Rincon Drain but 31 acres of the southern portion the peninsula created by the River and Tonuco Mountain will be deeded to EBID for this project as a cost share component if funding for this grant is awarded. The location of the 31 acres being contributed is shown below in Figure 6. This property is still useful by the current private land owner, who is an EBID constituent, but his contribution of this land as part of the cost share is indicative of the commitment of local farmers to this project. It is proposed by EBID that this land be used to widen EBID's Rincon Drain approximately 150 feet at its widest to create an engineered wetland as well as improving hydrologic connectivity between the floodplain and the Rio Grande 4.3 miles upstream of the current discharge point of the Rincon Drain.

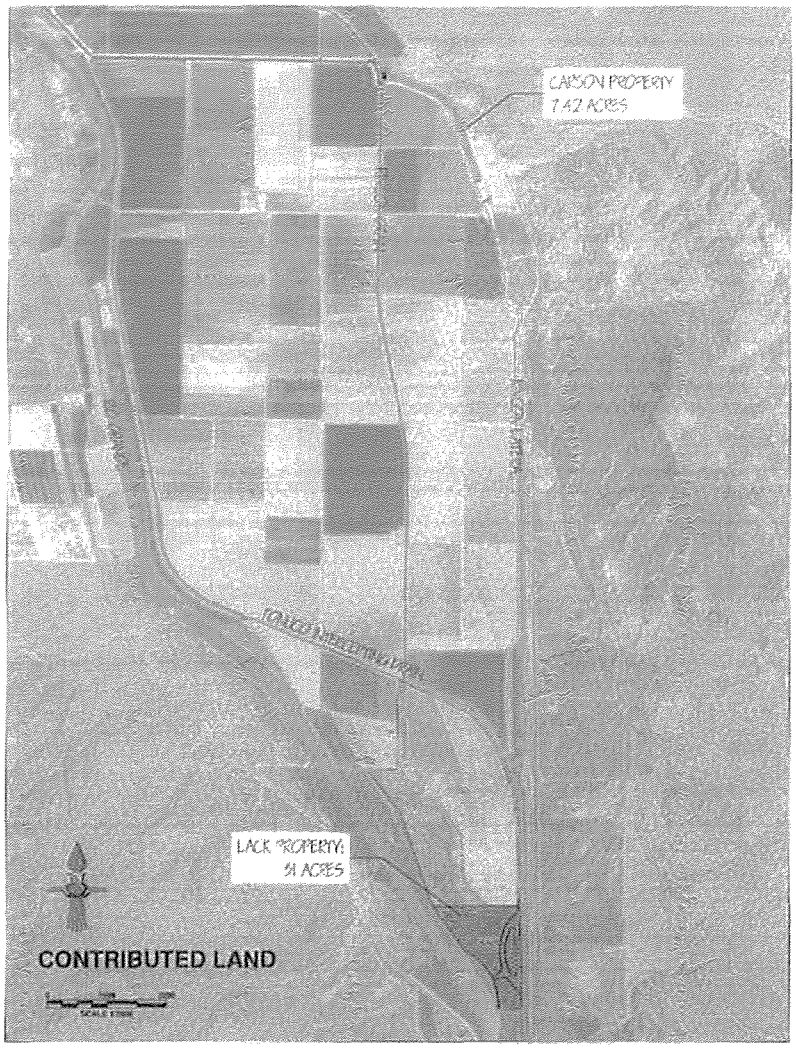

Figure 6. Map showing area of land to be deeded to EBID for Tonuco Pond.

The widened drain will also serve as a regulating reservoir for storm flows entering the site from two arroyos. The storm water can contribute to damaging peak flows in the main stem of the Rio Grande downstream. Temporary storage and timed release of the storm water contributes both to the safety of people and property downstream and to the water supply. In addition, in a recent report prepared by the Paso Del Norte Watershed Council (PdNWC) with funding from the Environmental Protection Agency under the 319(h) (PdNWC 2013) program, storm water runoff events have been identified as a key source of E. coli bacteria in the Rio Grande, the only contaminant for which this reach of the river is listed as impaired. Retention of storm water was identified as a key Best Management Practice for mitigating E. coli, as the retention of water provides die-off time for the bacteria (PdNWC 2013). Access to Tonuco ponds, and all proposed sites, is available to EBID by way EBID facilities, specifically the maintenance roads of the Rincon Lateral and Rincon Drain. Public access routes will be limited during times when the site may be ecologically sensitive, such as breeding season. Figure 7 shows the conceptual design of the area that the Rincon Drain will be widened to create Tonuco Pond.

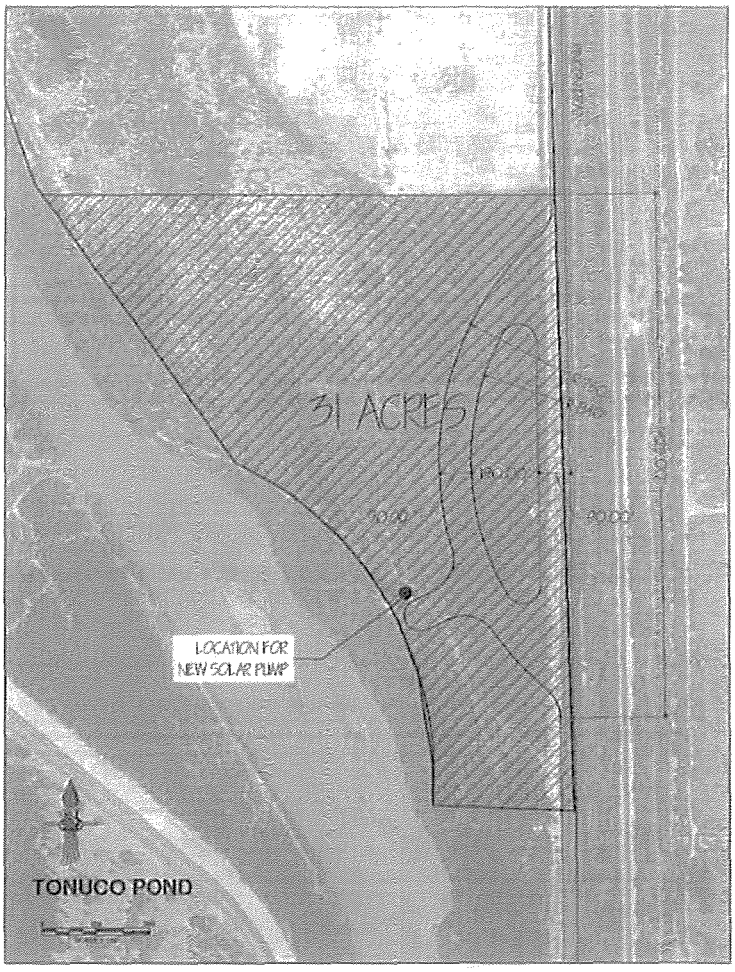

Figure 7. Conceptual drawing of Tonuco Pond

1.3.5. Habitat Restoration and benefits to endangered species: Tonuco Pond can be designed to be a very beneficial wetland that increases and improves the habitat available for endangered or threatened species known to nest in the area. EBID will bring consultants specializing in hydraulics engineering, surface water-groundwater interaction, environmental engineering and environmental landscape design. Conventional flood control and channelization projects have inadvertently depleted the cottonwood and willow trees that the endangered or threatened avian species prefer for nesting. Bell's vireo (*Vireo bellii*), which is listed as threatened in NM, and Yellow warbler (*Dendroica petechia*) require upper canopy habitat for nesting. Brand et al. 2009 found substantially higher species richness in cottonwood sites than in salt cedar or grassland sites. Thus native cottonwood and willow trees – a vital, defining part of the region's riparian ecosystems – require periodic flooding to reproduce naturally. The proposed water conservation and flood control follows an innovative approach to ecosystem restoration. Water, an essential element in ecosystem restoration and maintenance, should be available throughout the growing season to help maintain favorable habitat. By manipulating the base drain flows and episodic flood flows, EBID is uniquely able to provide controlled pulses of water to the site to mimic the natural hydrograph to which the native vegetation is adapted. It is also conceivable that with careful ecosystem management we will be able to expand the nesting grounds of the Southwestern Willow Flycatcher (*Empidonax traillii extimus*), a bird listed under the Endangered Species Act, to the restored drain. This expectation, though ambitious, is not unrealistic, considering that Broad Canyon (located approximately 2 miles to the south) is a favored nesting ground for this endangered bird, and the proposed habitat enhancements are suitable for the species.

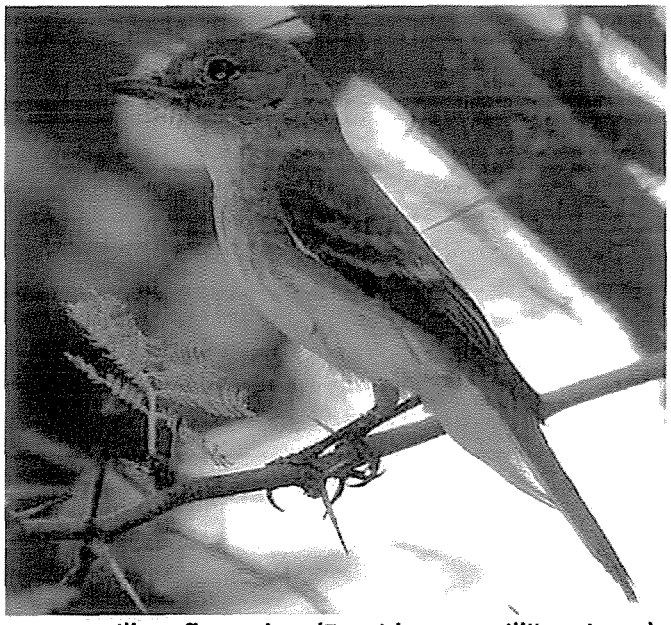

Figure 8: Southwestern willow flycatcher (Empidonax traillii extimus). From Wikimedia Commons.

1.3.6. Drain Connectivity to Rio Grande: It is also proposed that two 15 gallon per minute pumps, powered by solar panels, be included along the western edge of the widened drain to discharge drain water from the Tonuco Pond to the river to allow the groundwater to cycle and reduce the shallow groundwater problems for irrigated agriculture in the vicinity as well as the habitat nearby. These drains were intended to allow the shallow groundwater to return to the Rio Grande by gravity and keep the system's salt load in balance. Being at the southern end of the Hatch-Rincon Valley, this site receives the shallow subsurface return flow from much of the valley, and also has naturally occurring deep sources of salinity contributing to the salt loading. Because of a severe lack of maintenance of the river channel by the US International Boundary and Water Commission, the river channel has aggraded so much that the river bed is now 5 feet higher than the design elevation of the Rincon Drain. Because the groundwater cannot flow by gravity back into the river and cycle at the rate for which it was designed, drain flow and salt removal have slowed significantly, and water quality within the shallow groundwater has been impacted by elevated salinity. Crop production in the project area has been negatively impacted. By pumping this water to the river channel to induce the flow by gravity to this low point, the shallow groundwater will be able to drain as designed, a small amount of water will be added to the river channel, and wetland water quality will be improved for habitat.

The two pumps are experimental, and if evaluation of their effect shows benefit to the habitat and salt balance, more pump-solar panel units may be added to increase circulation.

1.3.7. Arroyo channel improvements - New Water: Two arroyos from the East mesa along the Rincon Lateral that once reached the lateral currently only reach EBID facilities in extreme storms because the water has been redirected by the land owner to prevent flooding damage. These arroyos with relatively small watersheds provide EBID a chance to capture and beneficially use the storm water. The runoff could be guided to the intersection of EBID's Rincon Lateral and Rincon Drain as seen in Figure 9 While the primary source of water for EBID is surface water from Elephant Butte Dam, an underutilized source is storm water runoff from intense monsoonal rainfall events that discharge into EBID's drain and canal facilities. EBID proposes to accept a maintenance easement for the downstream outlet of two arroyos of the Tonuco Mountain watershed area that will reach the Rincon Drain and eliminate the current ponding issues offsite. By designing a channel and maintaining it, EBID and Tonuco Pond will benefit from the "new" water that can then be used by downstream users including the habitat proposed as part of the Tonuco Pond. EBID also benefits from an engineered and maintained channel because it reduces the chance that the arroyos will break their existing improvised dikes and wash out EBID facilities. As a part of Tonuco Pond EBID proposes to expand the retention and regulation capacity of the Rincon Drain to allow direct use by habitat sited along the drain, controlled release to the Rio Grande to meet downstream needs, and infiltration for groundwater recharge. This approach has potential benefits to available water supply for EBID constituents, water quality, and riparian habitat in the drainage system. The biggest beneficiary of the arroyo improvements will be the native vegetation and habitat created by Tonuco Pond which will benefit greatly from more frequent and monsoonal irrigation. By improving the native vegetation at this Tonuco Pond, potential habitat will created for endangered species in the area.

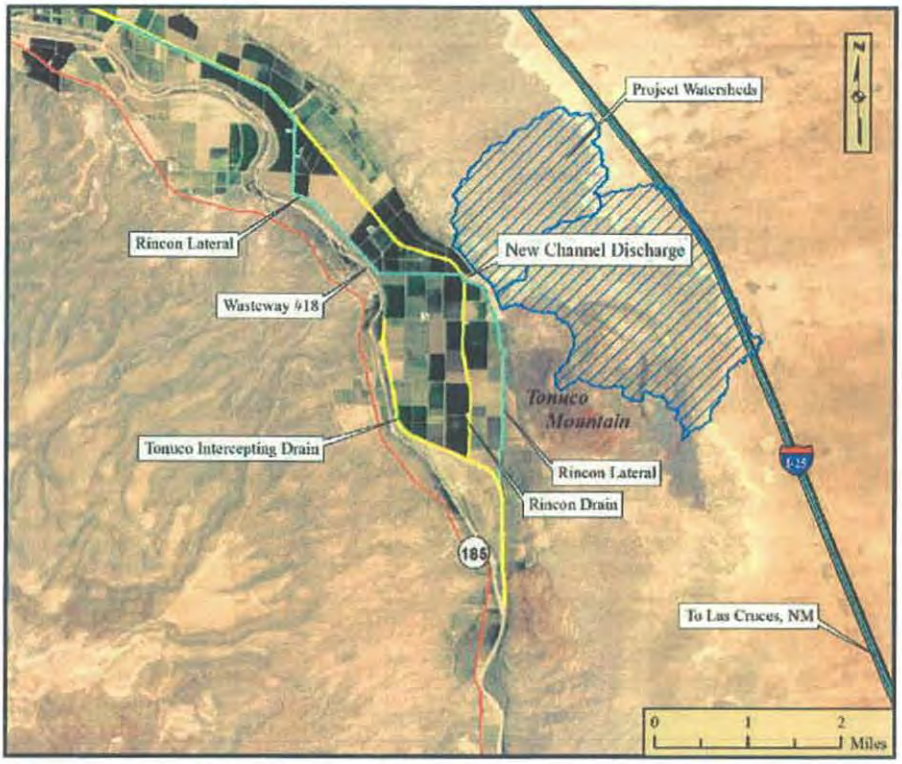

Figure 9. Watersheds contributing to arroyo channel improvements

Another benefit of the storm water capture is the mitigation of E. coli bacteria, the only contaminant for which this reach of the Rio Grande is listed as impaired, in the runoff. A recently-conducted study, funded by the US Environmental Protection Agency's 319(h) program, of the occurrence of E. coli in the New Mexico portion of the Rio Grande Project identified storm water runoff as the primary source of the contaminant in the Rincon Valley. The proposed work here is an implementation of the Best Management Practices recommended in that study.

1.3.8. Energy Nexus - Solar Panels: Once the Rincon Lateral is placed in pipe, the land formerly occupied by the unlined ditch, ditch banks, maintenance roads, and other right-of-way is available for other use. EBID proposes to install photovoltaic panels on the covered lateral to produce clean, renewable energy to partially offset the electrical demand for lift pumping from the other project components, turning the freed-up area into a small solar farm. Approximately 10 kW of solar electric capacity will be installed. These solar panels will be connected to El Paso Electric's grid as will the required lift pumps on the river. El Paso Electric grid power poles are in the immediate vicinity of the proposed location for the solar panels. The objectives of the solar array are to offset the energy cost of the river lift pump operation with revenue from the sale of the solar electricity, and to minimize the carbon footprint of the project. The feasibility study will include a technical and economic analysis and a pilot project and the 10kW array will serve as a proof-of-concept for further expansion. The approach is to turn the freed-up right-of-way

into a solar farm to reduce the net fossil energy requirements of the lift pumps. The solar panels will generate electricity for the grid, and the lift pumps will take their required energy from the grid.

1.3.9. Supporting Studies: Bird Surveys will be done by local consultants familiar with the area's avian species. Studies will be done twice – once at the onset of the project and once at the end - to document existing conditions and benefits of the proposed project to bird populations.

An environmental landscape design and study will be performed by a contracted Consultant, Dr. Rolston St. Hilare of New Mexico State Univeristy's Plans Sciences Department and other wetland experts to assist with the design and vegetation layout of the widened, cleaned, reshaped, and vegetated drain. This analysis will provide documentation of existing plant species and design a functional and sustainable ecoscape.

To assess the effect of the project on E. coli concentrations entering the Rio Grande, EBID Hydrotechs will sample arroyo runoff events as they enter the Tonuco Pond, and the discharges from the solar pumps and the main channel of the Rincon Drain at its confluence with the river. EBID is well equipped to perform this work, as the same Hydrotechs conducted the routine and storm sampling over three years as part of EBID's participation in the 319 (h) study of E. coli in the Rio Grande (PdNWC 2013).

The effects of the project on salinity in the local groundwater will be monitored with quarterly specific conductance measurements in Tonuco Pond by EBID Hydrotechs. In addition, the USGS monitors a nearby EBID shallow groundwater monitoring well, taking continuous readings on groundwater level and semiannual specific conductance measurements. These data will be included in the assessment of the impact on shallow groundwater quality.

1.4. Evaluation Criteria

1.4.1. Evaluation Criteria A: Water Conservation: The proposed work will conserve a substantial and quantifiable amount of water. Due to the ongoing drought, the hydrology of water conservation gets complicated. The annual allotment to EBID farmers for the past ten years (2003-2012) is 1.59 feet. Pro-rated over 90,640 water-righted acres, the basis of allotment in EBID, this amounts to a volume of about 144,000 AF. 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;
- Canal seepage (the largest loss term) which returns to the shallow alluvial groundwater system where it either is collected in the drain system and returned to the Rio Grande or pumped out of the ground by irrigators, municipal/industrial water providers, or domestic wells;
- Deep percolation during on-farm irrigation, which 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 evenly allotted to all EBID constituents, the same as any 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, when the City of Las Cruces begins using surface water, to CLC; c) there is a developing 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 or permanent basis.

The amount of water to be saved by this project is difficult to estimate, but a quantitative attempt is presented in

Var	Lateral seepage reduction		Source
A	12,830	feet	Project Plan
B	2.43	miles	A x 5,280
C	385	AF/mile/year	Haddad, 2005
D	936	AF seepage reduct./year	B x C
	Main On-farm deep percolation reduction		**Source**
E	2,242	acres	Project Plan
F	3.5	ft/year Consumptive Irig. Req't	Est. SS 101
G	7,847	AF/year Consumptive Irig. Req't	E x F
H	55%	irrigation eff	Typical AEN 478
J	14,267	Farm Delivery Req't	G/H
K	65%	irrig eff	Planned
L	12,072	Farm Delivery Requirement	G/K
M	2,195	AF FDR reduction/year	J - L
	Conveyance Loss reduction		**Source**
N	25%	main loss	Est.
O	3,773	AF main loss reduction/year	N x (1+N) x L
	Storm Water Capture		**Source**
P	50	acre-feet	Project Plan
Q	3	fill cycles, pond+drain+overbank	Est., high var
R	150	AF captured water/year	P x Q
	Total Water Conserved		
S	7,053	Total water conserved/year	D + M + O + R
T	$1,920,753	Project Cost	Budget
U	**$272.33**	**/AF conserved/year**	**T/S**
V	1.59	ft 10 year avg allotment	EBID records
W	144,118	AF avg allotted water	V x 90,640 ac
X	**4.89%**	**of avg allotted water conserved**	**S/W**

Table 2. The four water savings components – lateral seepage, on-farm deep percolation, and conveyance from the piping component and the storm water capture and reuse or recharge are analyzed based on best available information. Sources are included in the right-hand column, with the letters in the formulas referring to the line letters on the right hand side. Methodology and seepage rates were determined from seepage tests as part of a NMSU student's Masters thesis (Haddad, 2005).

Aluminized Corrugated Metal Pipe will be used to pipe the Rincon Lateral and concrete check and diversion boxes will be constructed where necessary. These materials virtually eliminate water lost from seepage and evaporation. The preliminary drawings are attached within the appendix. Reduction in canal losses will be done with the proposed improved metering.

Significantly, this estimate suggests that the cost of conserving water is about $270 per acre-foot per year, below the marginal value of water on most crops in the study area, and that about 7,053 acre-feet per year can be saved, nearly 5 percent of the average allotment of the past decade.

Var	Lateral seepage reduction		Source
A	12,830	feet	Project Plan
B	2.43	miles	A x 5,280
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P	50	acre-feet	Project Plan
Q	3	fill cycles, pond+drain+overbank	Est., high var
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V	1.59	ft 10 year avg allotment	EBID records
W	144,118	AF avg allotted water	V x 90,640 ac
X	**4.89%**	**of avg allotted water conserved**	**S/W**

Table 2: Water savings estimates for EBID's WHEN proposal.

1.4.2. Evaluation Criterion B: Energy-Water Nexus: EBID has always run as a gravity system until recent conservation measures have required low lift, high flow axial flows pumps. The proposed work will require energy to power pumps to lift water from the Rio Grande to the Rincon Lateral. EBID therefore will use land made available by burying laterals in pipe to pilot a solar array to keep the project as energy neutral as possible.

Approximately 10 kW of solar electric capacity will be installed. These solar panels will be connected to El Paso Electric's grid as will the required lift pumps on the river. El Paso Electric grid power poles are in the immediate vicinity of the proposed location for the solar panels. The objectives of the solar array are to offset the energy cost of the river lift pump operation with revenue from the sale of the solar electricity, and to minimize the carbon footprint of the project. The feasibility study will include a technical and economic analysis and a design for the pilot project. No water will be required for this renewable energy system. Calculations for annual energy production (18,250 kWh), consumption by river pumps (81,430 kWh), and production as a fraction of consumption (27 percent) are shown below in Table 3.

10	kW solar array
5	hours per day estimated average over the year
365	days
18,250	kWh per year from a 10kW system
22.28	cfs
15	ft lift
20,854.1	ft-lb/s
37.9	HP
44.6	BHP (@70% efficiency)
BHP * .7456998 = kW	
40.4	kW for both pumps
6	months
2	weeks per month
81,430	kWh for both pumps if run for 5 months
27.2	**% of energy required by pumps will be produced by solar array**

Table 3: Energy production calculations for 10 kW solar array and consumption by river pumps.

1.4.3. Evaluation Criterion C: Benefits to Endangered Species: The key endangered species in the project area is the southwestern willow flycatcher (SWFL). The SWFL is a riparian species requiring sizeable acreage of forest near flowing water. The construction of the Rio Grande Project in the early 1900s altered the natural hydrograph of the Rio Grande from an early spring peak corresponding to snowmelt runoff to a June and July peak, corresponding to irrigation demand. The canalization of the New Mexico portion of the Rio Grande Project in 1938 also removed most of the forest fringe along the Rio Grande's banks. The river channel is currently maintained by the US Section of the International Boundary and Water Commission (IBWC). In developing its management plan, IBWC has been consulting with EBID and Audubon New Mexico to develop mutually agreeable restoration strategies to support recovery of the SWFL and other riparian species with similar needs. This collaborative effort has made significant advances, including:

- An EBID board policy providing for acquisition of water rights and use of District water to support development restoration sites in the IBWC right-of-way, which could also extend to private land within the district;
- Identification and design of 30 restoration sites covering about 500 acres from Percha Dam to the Texas state line;
- Ongoing adaptive channel maintenance to minimize the disturbance of sensitive species by river dredging;
- Regular meetings to collaboratively balance environmental concerns with irrigation system operation and efficiency.

In 2012, the US Fish and Wildlife Service identified the reach of the Rio Grande from Percha Dam to Leasburg Dam, which includes the proposed project site, as suitable for designation as Critical Habitat for the SWFL. The grassroots restoration efforts and cooperation among IBWC, EBID, and Audubon New Mexico led the FWS to exclude the reach from Critical Habitat designation. The proposed work presented here will reinforce that collaborative effort, which is constructive but involves conflicting interests. The Biological Opinion stated 25 breeding territories as the recovery target. That target has already been exceeded. As the current drought deepens, the proposed enhancements, with the ability to regulate inflow and outflow will allow managers to optimize habitat value for the SWFL and other species in the area. The diversified water supply to the area, including local groundwater, drain flows, operational spills from the Rincon Lateral system, and storm water from the eastern arroyos, provides flexibility in supply and timing of delivery of water to the sites that actually make it more resilient to drought than the IBWC restoration sites on the main channel of the river. This resilience reduces the possibility of falling below the recovery target, and mitigates the need for Critical Habitat designation in the reach.

Mr. John Douglas, a private contractor, will monitor the avian population in the project site, with particular emphasis on the breeding season of the SWFL for the before and after assessment of the project's success at creating functioning habitat. Surveys for the SWFC on the

main stem of the Rio Grande are also conducted by US Fish and Wildlife as part of the monitoring and restoration effort in which EBID is an active participant.

EBID will monitor plant species and habitat quality in and around the Tonuco Pond by contracting with Dr. Rolston St. Hilare, a Professor and environmental landscape expert at New Mexico State University to monitor and map the progression of species in the drain project, and evaluate the quality of the habitat.

1.4.4. Evaluation Criterion D: Water Marketing: While marketing of water conserved is not a chief focus in this project, opportunities certainly exist for marketing to other farmers through EBID's transfer system, and new markets are developing for municipal/industrial transfers and usage for river habitat restoration. They are beyond the scope of this work, but should be recognized as they have the potential to add to the value of conserved water. In the current drought, it is unlikely that the farmers in the area served by the project would be marketing their water, but the improved efficiency and control that the project will provide them would motivate them to acquire additional surface water allotted to other farmers in the district who cannot use it as efficiently or productively.

1.4.5. Evaluation Criterion E: Other Contributions to Water Supply Sustainability: The proposed work makes more surface water available to farmers at their head gates, and can convey groundwater more efficiently. 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 hear is to reduce the reliance on groundwater, thus reducing the amount of pumping and energy required in agriculture.

Salinity is also a threat to the sustainability of agriculture and the water supply to the Rio Grande Project. The effects of the project on salinity will be monitor by EBID Hydrotechs, who will routinely measure specific conductance of the surface water in and around the project site. Specific conductance data from the monitoring well that USGS monitors just to the north of the project area will also be analyzed for project-related trends.

As stated earlier, E. coli bacteria has been identified a persistent contaminant in the area, and is associated with stormwater runoff events. It may also become an issue in Tonuco Pond with increasing avian source loading. EBID Hydrotechs will monitor inflow from the arroyos during storm events, and discharge from the pond back to the river to assess E. coli mitigation by the project. Periodic samples will also be taken in the absence of runoff events to track any changes in the background level of E. coli. The Hydrotechs have been trained in E. Coli sampling and analysis, and have all necessary equipment and supplies, having been key participants in the Paso del Norte Washed Council's three year, 319(h) study in the area.

1.4.6. Evaluation Criterion F: Implementation and Results: The proposed pipeline work 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. It serves as the key planning document that integrates usage across sectors in the Lower Rio Grande. The LRGWUO is beginning an update to the regional water plan to reflect the many changes that have occurred since 2004, including persistent drought and habitat restoration planning.

EBID is prepared to begin work immediately on notice to proceed. Initial wildlife and plant surveys, NEPA compliance, land transfers, 55 percent of the lateral piping, arroyo channelization, and river pump installation will all be completed in the first year of the project.

1.4.7. Evaluation Criterion G: Additional Non-federal Funding: The current plan is to match the federal funding with EBID funding on a 1:1 basis, for a 58 percent of non-federal contribution.

1.4.8. Evaluation Criterion H: Connection to Reclamation Project Activities: The Rio Grande Project is a Reclamation Project, and Reclamation continues to perform the central operation functions. All water delivered by EBID is Project Water. EBID coordinates operations on a daily basis with Reclamation. This project will certainly contribute to this basin and help to maintain productive agriculture in the face of drought and climate change.

2. Description of Performance Measures

Performance measures for the proposed work will be carried out by EBID staff, consultants, and collaborators. The plans for each of the three components are as follow:

2.1. Pipeline Installation:

The benefits of the pipelines are expected to arise from three effects of the work: seepage reduction in the piped laterals, seepage reduction from reduced conveyance distance and tai-to-head re-plumbing, and reduced on-farm deep percolation losses resulting from higher delivery flow rates. Performance measures for each of these follow.

2.1.1. *Seepage reduction in piped laterals:* EBID has significant experience in installing and evaluating the performance of pipe laterals. In the last ten years, EBID has placed approximately 27 miles of laterals in pipe. When the previous piping project began, a Masters candidate in Civil Engineering at New Mexico State University did his thesis on the water savings from reduced lateral seepage (Haddad, 2005). He performed ponded seepage tests before and after installation of pipe. One important conclusion he reached is that piping saves, on average, about 385 acre-feet of water per mile of piped lateral. He also developed a model for estimating seepage from a lateral to be piped based on Vedernikov's method, and it included consideration of channel geometry, soil type, and operating schedule. We will use Haddad's model to estimate the savings from reduced lateral seepage.

More recently, staff used records from EBID's Hydrology Department to assess losses based on measured inflows and deliveries for unimproved and piped laterals. The results, summarized below, are consistent with Haddad's findings. The measured conveyance efficiency in the laterals averaged 58 percent in unimproved laterals compared to 92 percent for pipeline laterals. The performance of the laterals to be piped on this project will be evaluated for losses

based on measured inflows and charges during the 2012 season and after the pipe is installed using this method.

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	Measured Inflow, AF	Charges, AF	No. Deliveries	Avg Charge (in)	Efficiency
Kilgore Lateral	1,165	822	24	6.08	71%
American Bend Lateral (+Hare, Arrington)	1,179	775	113	4.67	66%
Dona Ana Lateral (+Etajo,Barrio,Kelso)	1,834	912	285	5.03	50%
Brazito Lateral	431	212	52	4.07	49%
Anthony Lateral (Used 3 Irrigation Runs)	390	163	17	6.29	42%
Open Channel Totals	4,999	2,884	491	5.15	58%

Table 4: Conveyance loss evaluation for unimproved and piped EBID laterals during the 2012 water season.

2.1.2. Seepage reduction due to shortened conveyance and tail-to-head: 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 problems with the units that are targeted for improvement manifest themselves quantitatively as low conveyance efficiencies – often below 40 percent. 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.

2.1.3. On-farm deep percolation reduction due to higher delivery rates: 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. The senior level design class Agricultural Engineering 478, Irrigation and Drainage Engineering, performs laboratory assignments on EBID constituents' farms. Using standard methods, the student 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.

2.2 Drain Modification for Storm Water Capture, Habitat, and Water Quality

The three basic functions of the drainage system improvements will be evaluated as follows:

2.2.1. New water to Tonuco Pond:

Water which reaches the Rincon Drain, whether storm water, base drain flows, or water delivered to the drain via the new wasteway in the Rincon Lateral, will all be measured by a cutthroat flume within the Rincon Drain downstream of the wasteway and Storm water that flows into the drain will be measured at the inlet with an RBC flume with is already installed on the major arroyo. The flow at key points in the drain will be measured using gated hydraulic structures. When water is lifted into a lateral for direct use, the volume pumped out will be measured with a meter on the pump unit. A hydrologic balance will then be performed to determine how much water was a) directly used in the lateral, b) re-regulated and returned to the Rio Grande to meet downstream demand and delivery obligations, and c) infiltrated to recharge the local groundwater system. The analysis will be performed on an event-by event basis, as it is typically expected to occur four or five times per year.

3. Environmental and Cultural Resources Compliance

The project will not be a detriment to the surrounding environment, but rather an enhancement. EBID has extensive experience with all aspects of the project and surrounding areas except the solar energy production, and the first phase of that component will be a planning and feasibility study to identify and restrictions or compliance issues that may arise. Canal piping and drain work do not create any hazards or nuisances; on the contrary, neighbors to existing work have been delighted with the results, especially after EBID cleans the drain so that seeped groundwater flows like the drains were designed. Earth disturbing activities include piping the Rincon Lateral and installing solar panels within that newly available space, digging a channel alongside the Rincon Lateral to channel two arroyos to the Rincon Drain, and widening the Rincon Drain to create Tonuco Pond. Efforts are always taken to reduce effects to air and water quality including water trucks constantly on site and suspending work on windy days. The areas surrounding the Rincon Lateral is all farmland or IBWC levee. The 120 feet wide stretch of land contributed to EBID for the creation of the channel for arroyo waters to reach the Rincon Drain will be sufficient space for the creation of the channel and efforts will be made to minimize impacts outside this easement. The work widening the Rincon Drain will improve water quality and air quality concerns will be limited by a water truck on site throughout as well as silt fences where it is determined necessary by EBID engineers. Seeding and riparian habitat landscaping with native vegetation at the completion of the project will help with dust in the future, improving the condition of the area which is currently mostly barren. No noxious or invasive species hare known within the project areas and EBID crews are trained to avoid spreading these species.

The site is currently lacking in suitable habitat in terms of proximity to reliable water or canopy structure suitable for nesting for most bird species of concern in the area. Tonuco Pond and the wetlands created will be designed to specifically benefit habitat for all avian species in the area. A general survey for rare, threatened, and endangered species within the project boundaries including the Rincon Lateral, Rincon Drain, the proposed arroyo channel easement, and the proposed Tonuco Pond, will be required. This survey will also identify potential habitat for federal and state protected species of plants and animals. A review of both state and federal lists of protected species of plants and animals revealed that three species on the federals list: yellow-billed cuckoo, southwestern willow flycatcher, and interior least tern, may have potential habitat within or adjacent to the proposed project area. State species with threatened or endangered status that could be within the surrounding vicinity of the project area include common black-hawk, neo-tropical cormorant, and Bell's vireo. There have been no observed southwestern willow flycatchers within the project area. EBID will contract a biological survey that will result in a Biological Evaluation, which will include recommendations for avoidance or mitigation measures if any species with state of federal status are discovered within the project area.

The design of Tonuco Pond and the wetlands created will specifically avoid any areas that are designated or evaluated to be wetlands. Areas shown of Fish and Wildlife Service Wetland Mapper shows wetlands along the project boundaries of Tonuco Pond but not within the property being contributed to the project. It is our understanding that coordination with the US Army Corps of Engineers will not be required. The 31 acres parcel of Tonuco Pond will need to be evaluated to ascertain if there are any areas that qualify as wetland, which will include installing up to five wetland pits across the project area to document any portions of the site that meet the technical definition of wetland. The design of Tonuco Pond will not occupy the entire 31 acre parcel and therefore will designed such to avoid disturbing any areas that are determined to be a wetland or otherwise sensitive.

All of EBID is designated as a historically significant resource. As a result, EBID routinely works with the State Historical Preservation Officer (SHPO) before any action is taken. The laterals and drains are not sensitive, as they do not have any major structures that are assigned historical significance. A search of the Archaeological Records Management Section at New Mexico Historical Preservation Division and a 100% cultural resource survey for the 31 acre parcel of Tonuco Pond, the Rincon Lateral, Rincon Drain, and the proposed arroyo channel will be contracted. Besides the Rincon Drain and Rincon Lateral, 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.

The proposed projects will not have negative impact to low income or minority populations.

EBID's water delivery system was constructed as part of the Bureau of Reclamation Rio Grande Project. By piping the 12,830 ft of the Rincon Lateral, all structures will be replaced and the design will be modified in coordination with the farmers in the area.

4. Required Permits and Approvals

All construction work will take place within EBID's facilities and rights-of-way. No federal, state, or local permitting will be required for the construction of this proposed project.

The solar power generated by this project will be marketed to El Paso Electric Co. (EPE), the regional provider in the EBID area. EBID has worked with EPE with small-scale hydroelectric power, and will build on that relationship to market the solar power produced here. The feasibility study will examine the permitting and contractual requirements for putting solar electricity on the grid through EPE.

The new river diversion via the two proposed high-flow, low lift pumps will be coordinated with El Paso County Water Improvement District #1 and Bureau of Reclamation El Paso Office for accounting and measurement of diversions. The diversion of these pumps will be accounted for as part of EBID's total diversion at Percha Dam. EBID will request consultation with New Mexico Office of the State Engineer about any approvals required prior to the 2015 irrigation season.

5. Funding Plan

EBID's plan for funding includes a guaranteed minimum 50% 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 Board of Directors has committed to a minimum of 50% 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.

EBID members in the area directly benefiting from improved delivery timing have committed to showing their support through contributions to the cost share of the project. Joe Paul Jr. and Rosemary Lack of Lack Farms will contribute 31 acres of undeveloped farm land towards Tonuco Pond, as a cost share in support of the overall project as well as the habitat benfits that Tonuco Pond will provide. This land has been valued by a licensed appraiser at $8,000 per acre for a total contribution of $248,000. Nick and Irene Carson of Kit Carson Farms will contribute an easement, with an area of 7.42 acres of undeveloped farm land towards the arroyo improvements that will contribute "new water" to the Rincon Drain and Tonuco Pond. This easement has been valued by a licensed appraiser to be 90% of $8,000 per acre, for a total of $52,000. Mr. Bill Halsell of Halsell Farms has committed to contributing $100,000 of cash towards the project and has obligated to contribute this during the first month after the project is funded.

Funding Sources		Funding amount
Non-Federal entities		
	EBID	**712,196**
	EBID members-farmers	**400,000**
Non-Federal subtotal:		
Other Federal entities:		**none**
Requested Reclamation funding:		**703,557**
Total project funding:		**1,810,953**

Table 5: Summary of non-Federal and Federal funding sources.

Funding Group II request			
	Year 1 (FY2014)	Year 2 (FY2015)	Year 3 (FY2016)
Funding requested	346,148	347,372	115,000

Table 6: Funding Group II Funding Request.

6. Commitment Letters

EBID is providing the majority of non-federal funding, which is expressed in the board resolution in support of, and commitment to this proposal. The resolution is attached to this application. The cost share agreements of the contributing farms are also attached.

7. Project Budget Proposal

Table 7. Funding sources

Funding Sources	Percent of total project cost	Total cost by source
Recipient funding	58%	**1,112,196**
Reclamation funding	39%	808,557
Other Federal funding	none	
Totals		1,920,753

7.1. Budget Narrative
7.2. Budget Form

Letter of Support and Contribution for Elephant Butte Irrigation District
WaterSmart Grant Application 2014

Nick Carson

The below signed farmers within the Elephant Butte Irrigation District (EBID) agree that we support the proposed project and BOR WaterSmart Grant Proposal titled "Rincon WHEN: Water-Habitat-Energy-Nexus."

We agree and commit to provide a portion of the cost-share of the proposed projects, specifically the contribution of an operations and maintenance easement, within Section 26 of Township 19 South, Range 2 West, as shown on the attached exhibit: Contributed Land. The easement contributed comprises a strip of land 120 feet wide and 2693 long adjacent to and paralleling the Rincon Lateral from approximate Station 1657+42 to Station 1684+35 totaling 7.42 acres. This easement is being contributed to the Rincon WHEN conservation project administered by the Elephant Butte Irrigation District. 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, if selected. Transfer documents and plat will be finalized within the first month following the date the project is funded.

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

Business Name and Signatory Names	Address and Phone Number	Signature
Kit Carson Farms	PO Box 101 Rincon NM 87940 644-0300	Nick Carson
	644-0301	

Letter of Support and Contribution for Elephant Butte Irrigation District
WaterSmart Grant Application 2014

Joe Paul Lack Jr. and Rosemary Lack

The below signed farmers within the Elephant Butte Irrigation District (EBID) agree that we support the proposed project and BOR WaterSmart Grant Proposal titled "Rincon WHEN: Water-Habitat-Energy-Nexus."

We agree and commit to provide a portion of the cost-share of the proposed projects, specifically the contribution of land, within Section 12 of Township 20 South Range 2 West, as shown on the attached exhibit: Contributed Land. The land contributed comprises the southernmost 31 acres of a 784.4 acre tract. This land is being contributed for widening the Rincon Drain, also known as "Tonuco Pond," to this conservation project administered by the Elephant Butte Irrigation District. 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, if selected. Transfer documents and plat will be finalized within the first year following the date the project is funded.

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

Business Name and Signatory Names	Address and Phone Number	Signature
LACK FARMS INC	P.O. Bx 274 HATCH NM 87937 575-267-4438	649-4751
		JOE PAUL LACK 635-0274

Letter of Support and Contribution for Elephant Butte Irrigation District
WaterSmart Grant Application 2014

Bill Halsell

The below signed farmers within the Elephant Butte Irrigation District (EBID) agree that we support the proposed project and BOR WaterSmart Grant Proposal titled "Rincon WHEN: Water-Habitat-Energy-Nexus."

We agree and commit to provide a portion of the cost-share of the proposed projects, specifically the contribution of $100,000 to the Rincon WHEN conservation project administered by the Elephant Butte Irrigation District. 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, if selected. Transfer will be finalized within the first month following the date the project is funded.

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

Business Name and Signatory Names	Address and Phone Number	Signature
Halsell Farm LTD Halsell Family LTD #1 Bill Halsell	PO Box 695 Hatch NM, 87937	Billy D Halsell

RESOLUTION AUTHORIZING GRANT AGREEMENT
WITH UNITED STATES BUREAU OF RECLAMATION
WATERSMART FUNDING OPPORTUNITY
RESOLUTION NO. 2014-001

WHEREAS, the Elephant Butte Irrigation District of Las Cruces, New Mexico, Dona Ana County of the State of New Mexico shall enter into a Grant Agreement with the United States Bureau of Reclamation, and,

WHEREAS, the grant being applied for is known as "WaterSMART: Water and Energy Efficiency Grants for FY 2014," Funding Opportunity Number R1AS00001.

NOW THEREFORE, BE IT RESOLVED that the Elephant Butte Irrigation District Board of Directors approves to commit to at least 50% cost share of the designated projects over three years within EBID Boundaries if grant proposal is awarded, and authorizes Gary Esslinger, Treasurer-Manager, or his successor as Signatory Authority to sign agreement documents and documents requiring a signature for submittal to the United States Bureau of Reclamation.

PASSED, APPROVED, AND ADOPTED in session this 15th day of January 2014.

James Salopek, President
Board of Directors
Elephant Butte Irrigation District

Robert Faubion, Vice President

M. Jean Hinsley, Notary Public
Commission expires: 12/21/2014

Elephant Butte Irrigation District
BOR WaterSmart 2014 Budget Details - Form 424A
Funding Oppportunity Announcement No. R14AS00001
Table 4 Budget Proposal

Salaries and Wages				
A	B $/Unit	C Quantity	C Quantity Type	E Cost
Leo Barrett-Maintenance Project Director	$ 4,928.00	2.500	monthly	$ 12,320.00
ZacharyLibbin-Jr. Engineer	$ 4,336.00	1.000	monthly	$ 4,336.00
Assistant Watermaster-So	$ 3,552.00	2.750	monthly	$ 9,768.00
Engineering Assist	$ 2,816.00	0.750	monthly	$ 2,112.00
Patrolman	$ 1,712.00	2.750	monthly	$ 4,708.00
Patrolman	$ 2,336.00	2.750	monthly	$ 6,424.00
Maintenance Foreman-C	$ 3,488.00	1.500	monthly	$ 5,232.00
Maintenance Foreman-N	$ 3,488.00	5.000	monthly	$ 17,440.00
Assistant Watermaster-N	$ 3,488.00	3.000	monthly	$ 10,464.00
Assistant Watermaster-C	$ 3,488.00	3.000	monthly	$ 10,464.00
Assistant Watermaster-S	$ 3,056.00	3.500	monthly	$ 10,696.00
HE Equip. Operator II	$ 2,528.00	6.500	monthly	$ 16,432.00
HE Equip. Operator II	$ 2,208.00	8.750	monthly	$ 19,320.00
HE Equip. Operator I	$ 1,776.00	3.000	monthly	$ 5,328.00
HE Equip. Operator I	$ 2,272.00	6.500	monthly	$ 14,768.00
Weed Control	$ 1,440.00	3.000	monthly	$ 4,320.00
Patrolman	$ 1,856.00	3.000	monthly	$ 5,568.00
Patrolman	$ 1,280.00	3.000	monthly	$ 3,840.00
Patrolman	$ 2,224.00	3.500	monthly	$ 7,784.00
Patrolman	$ 2,464.00	3.500	monthly	$ 8,624.00
Patrolman	$ 1,648.00	3.500	monthly	$ 5,768.00
Patrolman	$ 2,240.00	3.500	monthly	$ 7,840.00
Patrolman	$ 1,984.00	3.500	monthly	$ 6,944.00
Patrolman	$ 1,888.00	3.500	monthly	$ 6,608.00
Patrolman	$ 1,360.00	3.500	monthly	$ 4,760.00
Welder	$ 3,296.00	3.150	monthly	$ 10,382.40
Welder Assistant	$ 1,888.00	1.000	monthly	$ 1,888.00
Maintenance Fleet/Equipment Supervisor	$ 3,888.00	1.500	monthly	$ 5,832.00
Maintenance Fleet/Equipment Mechanic	$ 3,168.00	1.500	monthly	$ 4,752.00
Maintenance Fleet Mechanic	$ 2,064.00	1.500	monthly	$ 3,096.00
Hydrology Technician	$ 2,384.00	1.000	monthly	$ 2,384.00
Weed Control	$ 1,728.00	6.500	monthly	$ 11,232.00
Weed Control	$ 1,600.00	5.000	monthly	$ 8,000.00
Patrolman	$ 2,288.00	3.000	monthly	$ 6,864.00
Patrolman	$ 1,760.00	4.500	monthly	$ 7,920.00
Hydrology Technician	$ 2,256.00	0.375	monthly	$ 846.00
		115.775		
Total Personnel				$ 275,064.40

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 in the amount of $275,064.40 is derived from the current pay scales of EBID employees

The project personnel consists of the Project Director and EBID Jr. Engineer, along with middle managers and EBID labor force.
The Davis-Bacon Wage Determinations do not apply to this grant.

Fringe Benefits				
A	B $/Unit	C Quantity	D Quantity Type	E Cost
Maintenance Project Director	40.00%	$ 12,320.00	Full Package	$ 4,928.00
Jr. Engineer	40.00%	$ 4,336.00	Full Package	$ 1,734.40
Assistant Watermaster-So	40.00%	$ 9,768.00	Full Package	$ 3,907.20
Engineering Assist	40.00%	$ 2,112.00	Full Package	$ 844.80
Patrolman	40.00%	$ 4,708.00	Full Package	$ 1,883.20
Patrolman	40.00%	$ 6,424.00	Full Package	$ 2,569.60
Maintenance Foreman-C	40.00%	$ 5,232.00	Full Package	$ 2,092.80
Maintenance Foreman-N	40.00%	$ 17,440.00	Full Package	$ 6,976.00
Assistant Watermaster-N	40.00%	$ 10,464.00	Full Package	$ 4,185.60
Assistant Watermaster-C	40.00%	$ 10,464.00	Full Package	$ 4,185.60
Assistant Watermaster-S	40.00%	$ 10,696.00	Full Package	$ 4,278.40
HE Equip. Operator II	40.00%	$ 16,432.00	Full Package	$ 6,572.80
HE Equip. Operator II	40.00%	$ 19,320.00	Full Package	$ 7,728.00
HE Equip. Operator I	40.00%	$ 5,328.00	Full Package	$ 2,131.20
HE Equip. Operator I	40.00%	$ 14,768.00	Full Package	$ 5,907.20
Weed Control	40.00%	$ 4,320.00	Full Package	$ 1,728.00
Patrolman	40.00%	$ 5,568.00	Full Package	$ 2,227.20
Patrolman	40.00%	$ 3,840.00	Full Package	$ 1,536.00
Patrolman	40.00%	$ 7,784.00	Full Package	$ 3,113.60
Patrolman	40.00%	$ 8,624.00	Full Package	$ 3,449.60
Patrolman	40.00%	$ 5,768.00	Full Package	$ 2,307.20
Patrolman	40.00%	$ 7,840.00	Full Package	$ 3,136.00
Patrolman	40.00%	$ 6,944.00	Full Package	$ 2,777.60
Patrolman	40.00%	$ 6,608.00	Full Package	$ 2,643.20
Patrolman	40.00%	$ 4,760.00	Full Package	$ 1,904.00
Welder	40.00%	$ 10,382.40	Full Package	$ 4,152.96
Welder Assistant	40.00%	$ 1,888.00	Full Package	$ 755.20
Maintenance Fleet/Equipment Supervisor	40.00%	$ 5,832.00	Full Package	$ 2,332.80
Maintenance Fleet/Equipment Mechanic	40.00%	$ 4,752.00	Full Package	$ 1,900.80
Maintenance Fleet Mechanic	40.00%	$ 3,096.00	Full Package	$ 1,238.40
Hydrology Technician	40.00%	$ 2,384.00	Full Package	$ 953.60
Weed Control	40.00%	$ 11,232.00	Full Package	$ 4,492.80
Weed Control	40.00%	$ 8,000.00	Full Package	$ 3,200.00
Patrolman	40.00%	$ 6,864.00	Full Package	$ 2,745.60
Patrolman	40.00%	$ 7,920.00	Full Package	$ 3,168.00
Hydrology Technician	40.00%	$ 846.00	Full Package	$ 338.40
	Total Fringe Benefits			$ 110,025.76

Fringe benefits for the employees assigned to this project are 40% 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, lie insurance, retirement, annual, sick and holiday leave, as well as FICA, workmen's compenation and unemployment insurance.

Equipment- EBID owned and used for project work				
A	B $/Unit ACOE Rates	C Quantity	D Quantity Type	E Cost
Crawler Cat D7F	$ 48.45	160.000	hourly	$ 7,752.00
CAT Scraper 613	$ 70.08	240.000	hourly	$ 16,819.20
Lube Truck W/711-0092	$ 15.00	880.000	hourly	$ 13,200.00
6 x 6 Army Truck 2 1/2 T	$ 37.60	320.000	hourly	$ 12,032.00
John Deere 550J Dozer	$ 45.59	240.000	hourly	$ 10,941.60
Tandem Dump Truck	$ 49.36	320.000	hourly	$ 15,795.20
JD Backhoe 410E	$ 31.24	80.000	hourly	$ 2,499.20
Loader	$ 67.98	240.000	hourly	$ 16,315.20
Excavator	$ 84.91	240.000	hourly	$ 20,378.40
Tandem Dump Truck	$ 49.36	560.000	hourly	$ 27,641.60
JD Backhoe 710g-E	$ 38.62	120.000	hourly	$ 4,634.40
Case Loader Mod CA621DBA	$ 47.13	240.000	hourly	$ 11,311.20
Case Loader	$ 47.13	240.000	hourly	$ 11,311.20
Volvo EC160CL Excavator	$ 48.02	360.000	hourly	$ 17,287.20
Volvo Excavator EC160CL	$ 48.02	360.000	hourly	$ 17,287.20
Volvo 330 Excavator	$ 84.91	680.000	hourly	$ 57,738.80
Caterpillar Motor Grader	$ 49.40	320.000	hourly	$ 15,808.00
CAT 621F Water Buffalo	$ 125.16	240.000	hourly	$ 30,038.40
Ford F-250 4x4 Util Bed 2002	$ 25.00	480.000	hourly	$ 12,000.00
Ford F-350 2006	$ 24.49	160.000	hourly	$ 3,918.40
Welding Truck	$ 15.97	240.000	hourly	$ 3,832.80
	Total Equipment Used			$ 328,542.00

Heavy equipment and vehicles used to complete this project work are owned by EBID.

Equipment hourly rates are derived from the Army Corps of Engineers Ownership and Operating Expense Schedule-District VI

Equipment / Property Acquisition				
	B $/Unit	C Quantity	D Quantity Type	E Cost
10 kilowatt solar panels	$ 4,000.00	10.000	each	$ 40,000.00
Solar pump (low lift)	$ 25,000.00	1.000	each	$ 25,000.00
2 pumps 5,000 gpm	$ 47,350.00	2.000	each	$ 94,700.00
Land Acquisition	$ 7,182.32	7.240	acre	$ 52,000.00
Land Acquisition	$ 8,000.00	31.000	acre	$ 248,000.00
D8 Cat Dozer Equipment Rental	$ 15,000.00	2.000	each	$ 30,000.00
623 Cat Scraper - Equipment Rental	$ 15,000.00	2.000	each	$ 30,000.00
623 Cat Scraper - Equipment Rental	$ 15,000.00	2.000	each	$ 30,000.00
	Total Equipment / Property Acquisitions			$ 549,700.00

10 Kw solar panels and associated electrical hardware including inverters and wiring and mounting hardware. The prices are based on experienced consultant price estimates.

A low lift pump with dedictated solar panels are required to pump pond water to the River channel. The price is based on experienced consultant price estimates.

Two 5,000 gpm pumps are required to supplement irrigtion flows from the Rio Grande to the Rincon Lateral to improve delivery and efficiencies.

The price is based on a quote received from an applicable vendor supplying this type of equipment.

Land Acquisition - 7.24 acres for the Arroyor Inlet "new water" project is an easement required to allow EBID to design, construction and maintain the proposed new flood protection and new water project.

The value of the easement is determined by licensed appraiser services obtained by EBID to determine the property value and substantiated by a formal report. The eastment value was determined to be 90% of the full property value.

Land Acquisition - 31 acres for the Tonuco Pond will be transferred to EBID by quitclaim deed. The value of the land was determined by

The value of the land was determined to be $8,000 per acre as part of the parent tract of land per the appraiser.

The three pieces of rental equipment are based on EBID prior rental hisotry. The rental rate is a monthly rate determined by the vendor supplying this equipment.

These large pieces of equipment are not normally required by EBID maintenance department, and therefore will be rented for the temporary term of this portion of the project.

Supplies and Materials					
	B $/Unit		C Quantity	D Quantity Type	E Cost
CD110-B-4S DI Radio Telemetry Unit	$	1,794.00	5.000	each	$ 8,970.00
NEMA 4 Enclosure SNG-3731	$	43.20	5.000	each	$ 216.00
SP20 20 watt solar panel and bracket	$	289.00	5.000	each	$ 1,445.00
Yagi Antenna, 5 element	$	229.00	5.000	each	$ 1,145.00
Doppler Flow Sensors	$	1,895.00	3.000	each	$ 5,685.00
Pressure Transmitters 0-5 psi	$	481.45	2.000	each	$ 962.90
Metal Magmeters for River Pumps	$	1,935.00	4.000	each	$ 7,740.00
Check Box including gates	$	9,313.67	6.000	each	$ 55,882.02
Distribution Box includes gates	$	4,218.00	4.000	each	$ 16,872.00
Pump Box	$	8,524.00	1.000	each	$ 8,524.00
Ultra Flo Pipe 48" x 24'	$	32.56	12096.000	each	$ 393,811.35
Ultra Flo Pipe 48" x 16'	$	32.56	16.000	each	$ 520.91
Ultra Flo Pipe 48" x 12'	$	32.56	72.000	each	$ 2,344.12
Ultra Flo Pipe 48" x 24'	$	15.84	312.000	each	$ 4,943.17
Hel Cor 48" Elbow	$	901.59	2.000	each	$ 1,803.19
Hel Cor 48" Elbow	$	771.37	2.000	each	$ 1,542.73
Hel Cor 48" Elbow	$	706.25	2.000	each	$ 1,412.50
Hel Cor 48" Elbow	$	706.25	2.000	each	$ 1,412.50
Hel Cor 48" Elbow	$	258.21	1.000	each	$ 258.21
Transmission tee 48"	$	1,314.11	32.000	each	$ 42,051.37
CSP BD 5-C RVTD 48" (pipe connectors)	$	48.84	550.000	each	$ 26,859.64
CSP BD 5-C RVTD 24" (pipe connectors)	$	23.77	14.000	each	$ 332.80
Concrete Apron	$	9,000.00	1.000	each	$ 9,000.00
Portland Cement	$	9.56	30.000	each	$ 286.80
	Total Supplies and Materials				$ 594,021.21

The materials and supplies that will be used for this porject are to required to pipe the Rincon Lateral and improve metering of the pipeline flows.
The costs are determined by quotes received from applicable vendors providing these products.
Pipeline check boxes and distribution boxes prices are determined from recent and similar projects.

Contractual/Construction					
	B $/Unit		C Quantity	D Quantity Type	E Cost
King Engineering	$	75.00	160.000	hourly	$ 12,000.00
Cadena and Associates	$	75.00	200.000	hourly	$ 15,000.00
Environmental/Landscape consulting	$	75.00	40.000	hourly	$ 3,000.00
Control Design, Inc.	$	90.00	40.000	hourly	$ 3,600.00
	Total Contractual/Construction				$ 33,600.00

King Engineering - will provide hydrology and civil engineering sevices to assist EBID in house engineering staff with design, construction and reporting.

Cadena and Associates - will provide environmental, civil and electrical engineering services to assist EBID in house engineering staff with design, construction. And enviromental and regulatory compliance and reporting.

Rolston St. Hilare - will provide environmental landscape design and expertise with reparian vegetation selection.
Control Design, Inc. will provide services associated with remote telemetry that accompanys increased improved metering of pipeline flows.
These contractors currently have contracts with EBID that establish hourly rates and services.

Other					
	B $/Unit		C Quantity	D Quantity Type	E Cost
Environmental compliance	$	25,000.00	1.00	each	$ 25,000.00
EBID Jr. Engineer	$	45.00	40.000	each	$ 1,800.00
King Engineering	$	75.00	40.00	each	$ 3,000.00
		Total Other			$ 29,800.00

This value has been budgeted for environmental compliance costs incurred by BOR or EBID in complying with environmental regulations applicable to federal funding.
Including costs associated with any required documentation of environmental compliance, analyses, permits or approvals.
Engineering staff time has been budgeted to report on the status of the project on a regular basis as required.

Salary/Wages	$	275,064.40
Benefits	$	110,025.76
Equipment	$	328,542.00
Equipment / Property Acquisitions	$	549,700.00
Supplies/Materials	$	594,021.19
Contractual/Construction Services	$	33,600.00
Other	$	29,800.00
	$	1,920,753.35
EBID	$	812,196.06
Other Sources	$	400,000.00
Federal Sources	$	708,557.29
GRAND TOTAL	$	1,920,753.35

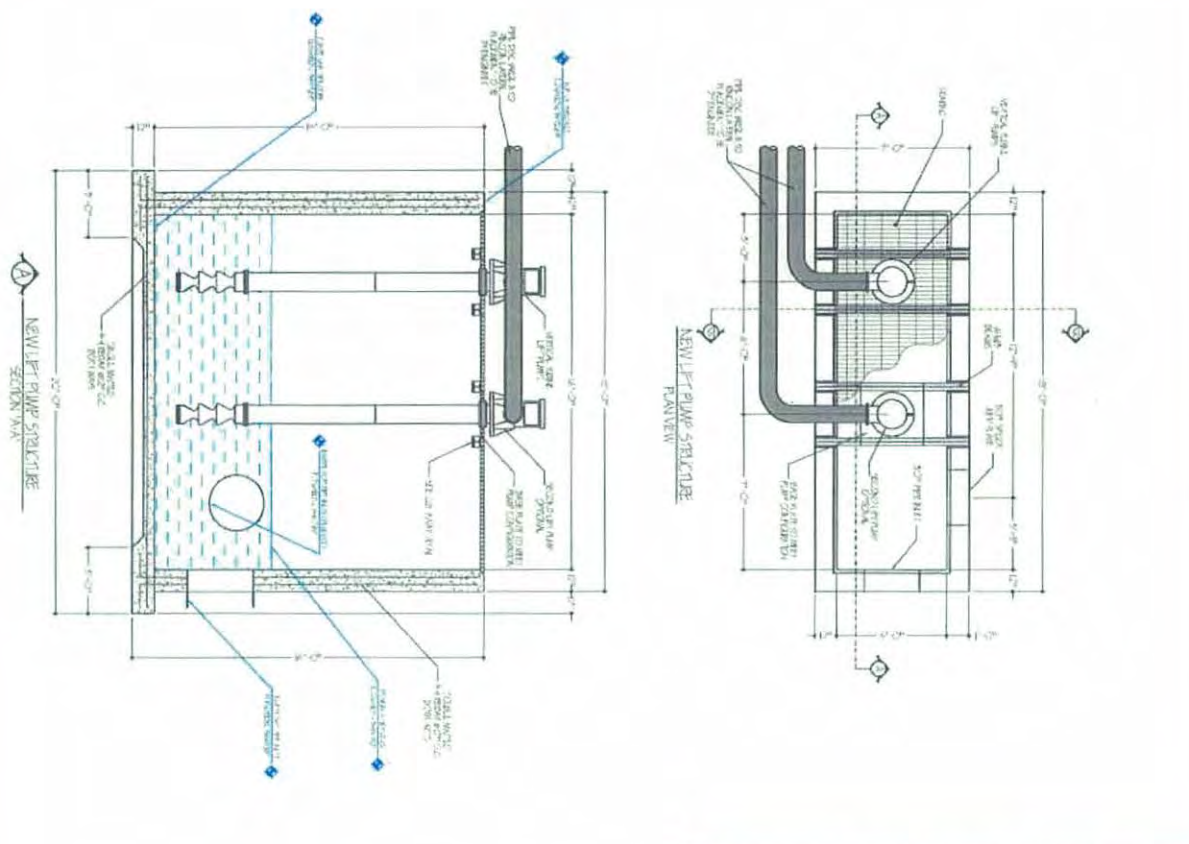
References

Al-Haddad, S., 2005. *Estimating Seepage from Irrigation Canals in the Elephant Butte Irrigation District, New Mexico*. Masters thesis, Civil Engineering, NMSU.

King, J. P. and J. Maitland, 2003. *Water for River Restoration: Potential for Collaboration between Agricultural and Environmental Water Users in the Rio Grande Project Area*. Prepared for the Chihuahuan Desert Program, World Wildlife Fund.

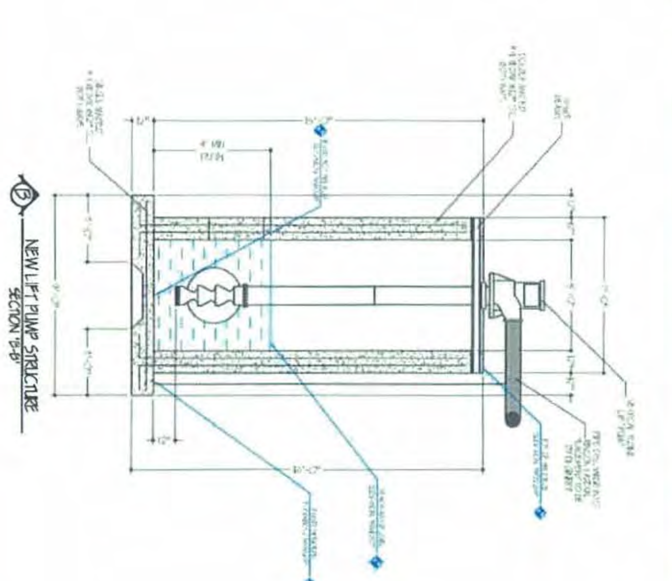
Paso del Norte Watershed Council 2013. *The Paso del Norte Watershed Based Plan – Mitigation Measures to Reduce Bacterial Pollution in the Rio Grande*. Funded by the USEPA through the New Mexico Environment Department under the authority of the Clean Water Act Section 319(h).

Appendices



NEW LIFT PUMP STRUCTURE
SECTION "A-A"

NEW LIFT PUMP STRUCTURE
PLAN VIEW



NEW LIFT PUMP STRUCTURE
SECTION "B-B"

SITE MAP

ELEPHANT BUTTE IRRIGATION DISTRICT

EBID

ENG. JOB #	2010-120
DWG FILE	[illegible]
DESIGNED	h. MAGALLANEZ
DRAWN	I.M. Morales
PRINT DATE	
APPROVED	

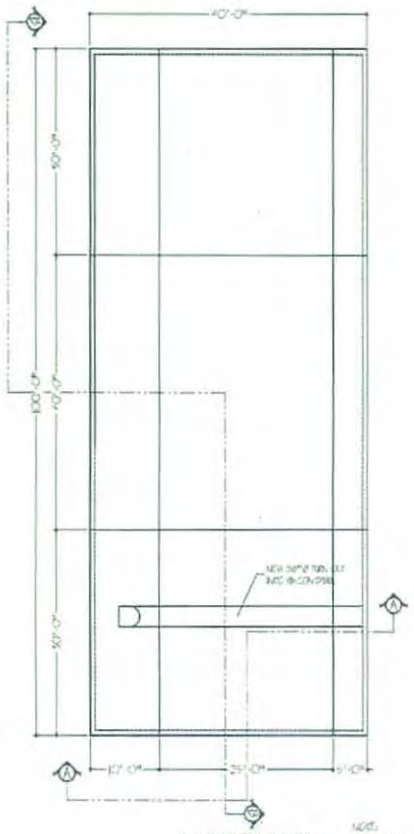
NEW LIFT PUMP STRUCTURE
RINCON LATERAL / WASTEWAY 18

REVISIONS

DATE	REMARKS

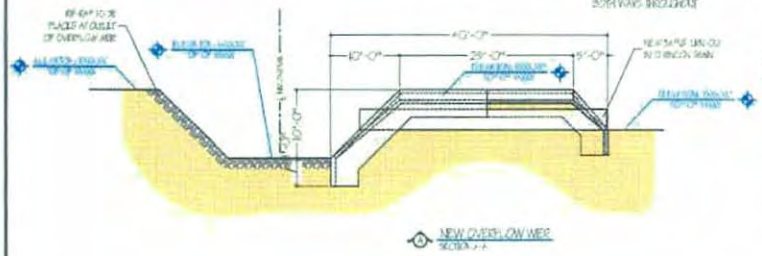
A

SHEET 1 OF 1

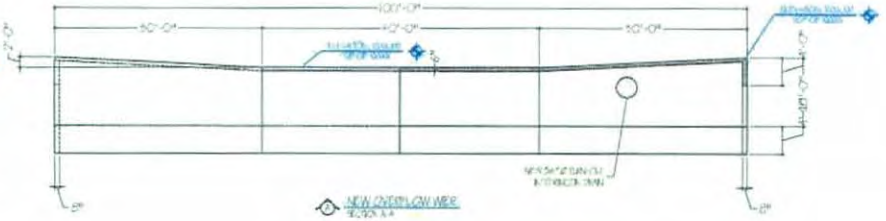


NEW OVERFLOW WEIR
PLAN VIEW

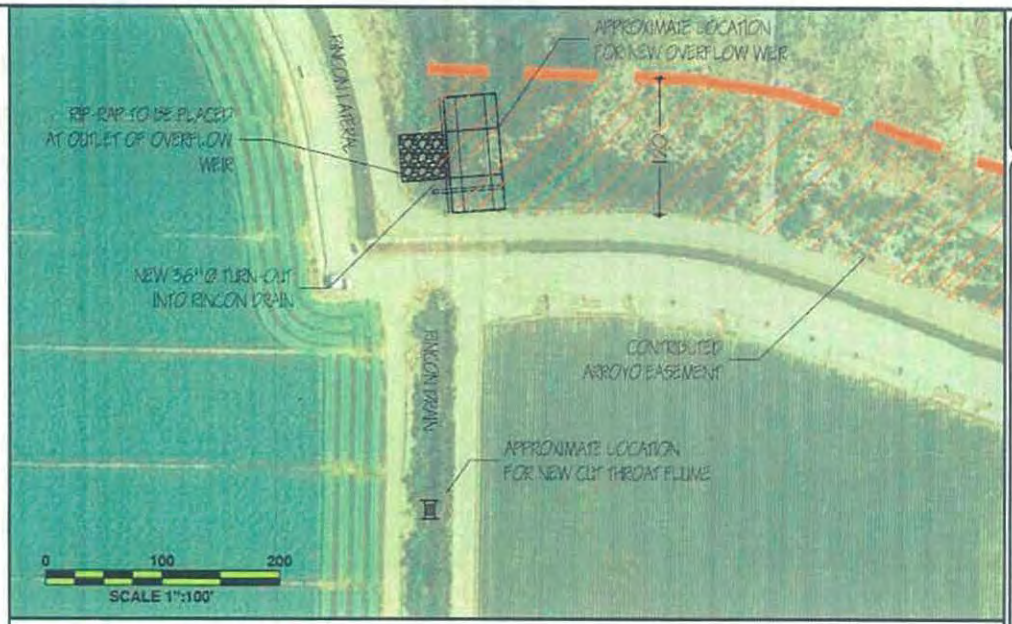
NOTE:
SINGLE WEEP HOLE
TO BE PLACED @12' O.C.
BOTH SIDES THROUGHOUT



NEW OVERFLOW WEIR
SECTION A-A



NEW OVERFLOW WEIR
ELEVATION B-B



NEW CUT-THROAT FLUME
TO BE INSTALLED AT APPROXIMATE
STATION 130+ 75 FOR METERING
DRAIN FLOWS INTO TONUCO POND

(SEE DETAL ON SHEET X)

ELEPHANT BUTTE IRRIGATION DISTRICT

E

SHEET 4 OF 4

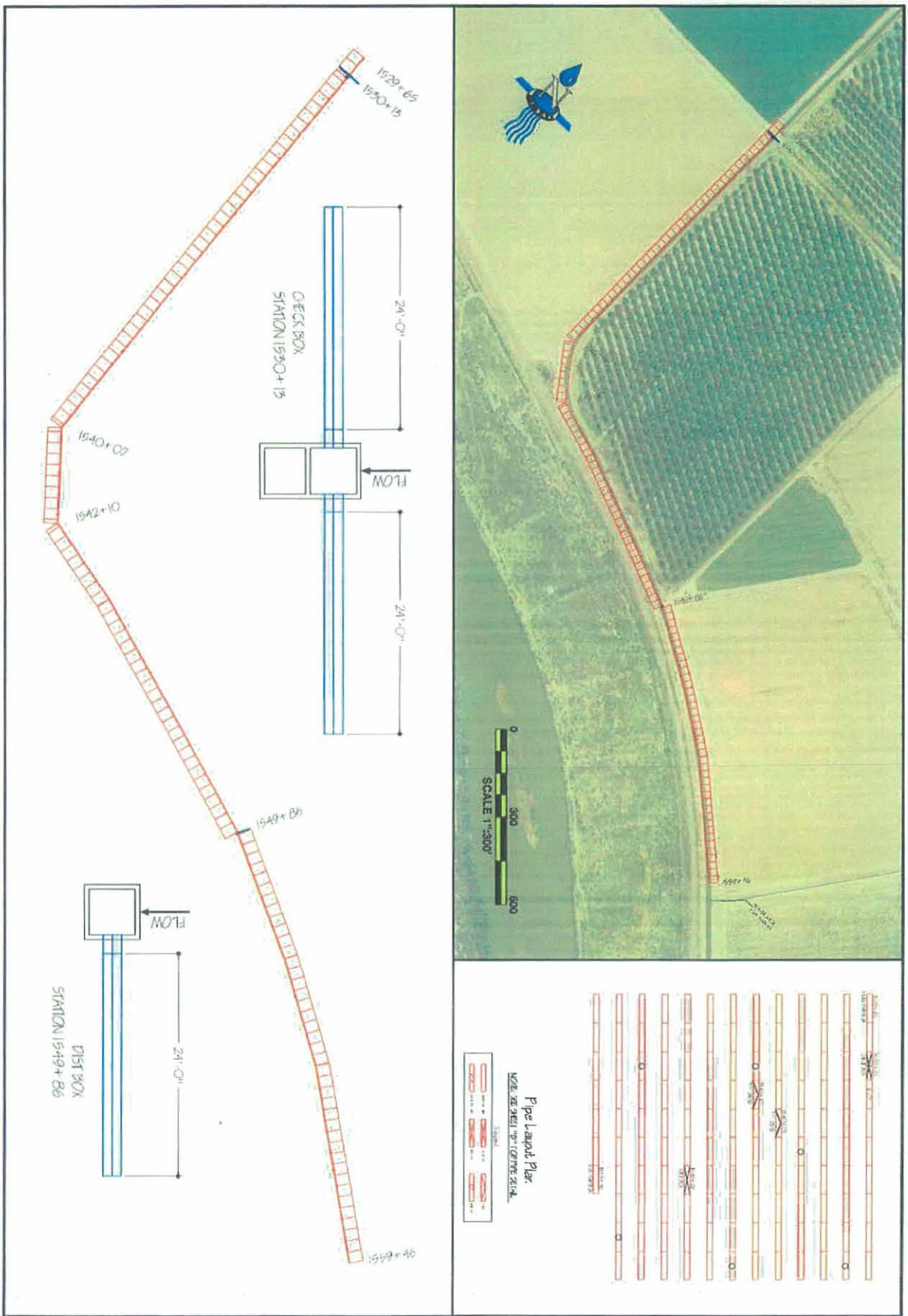
REVISIONS

DATE	REMARKS

RINCON DRAIN
NEW OVERFLOW WEIR

ENG. JOB #
DWG FILE
DESIGNED
DRAWN
PRINT DATE
APPROVED

EBID



ELEPHANT BUTTE IRRIGATION DISTRICT

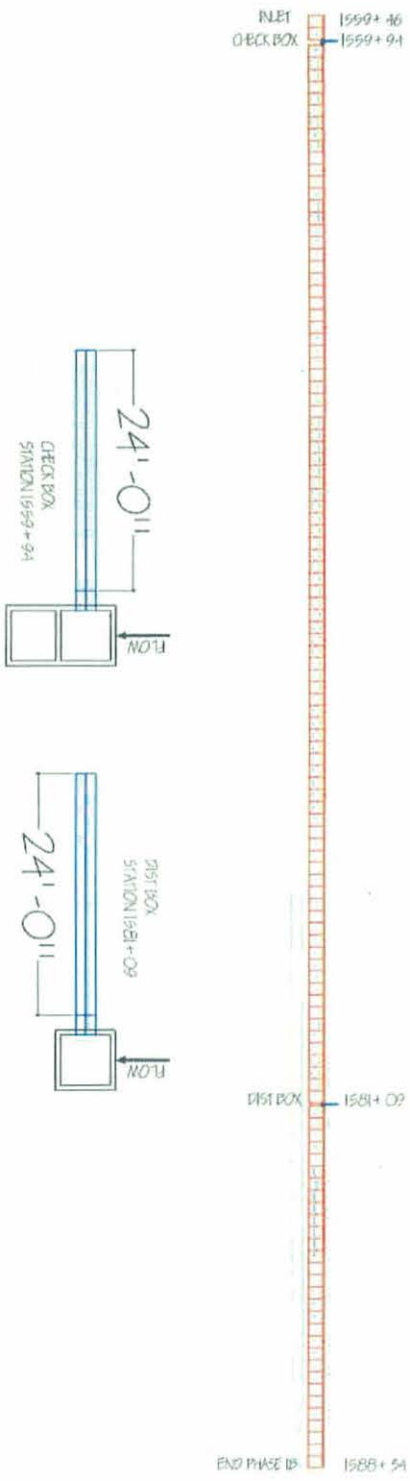
ENGR. JOB #	xxx xx
DWG FILE	
DESIGNED	
DRAWN	
PRINT DATE	
APPROVED	

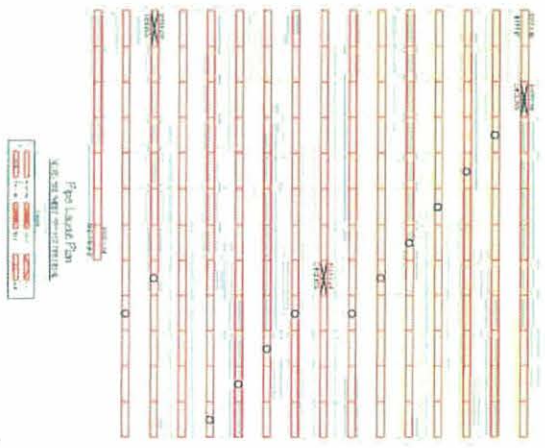
RINCON LATERAL
PIPELINE
FROM STATION# 1529+65 THRU 1559+46

REVISIONS	
DATE	REMARKS

1A

SHEET 1 OF 4





ELEPHANT BUTTE IRRIGATION DISTRICT

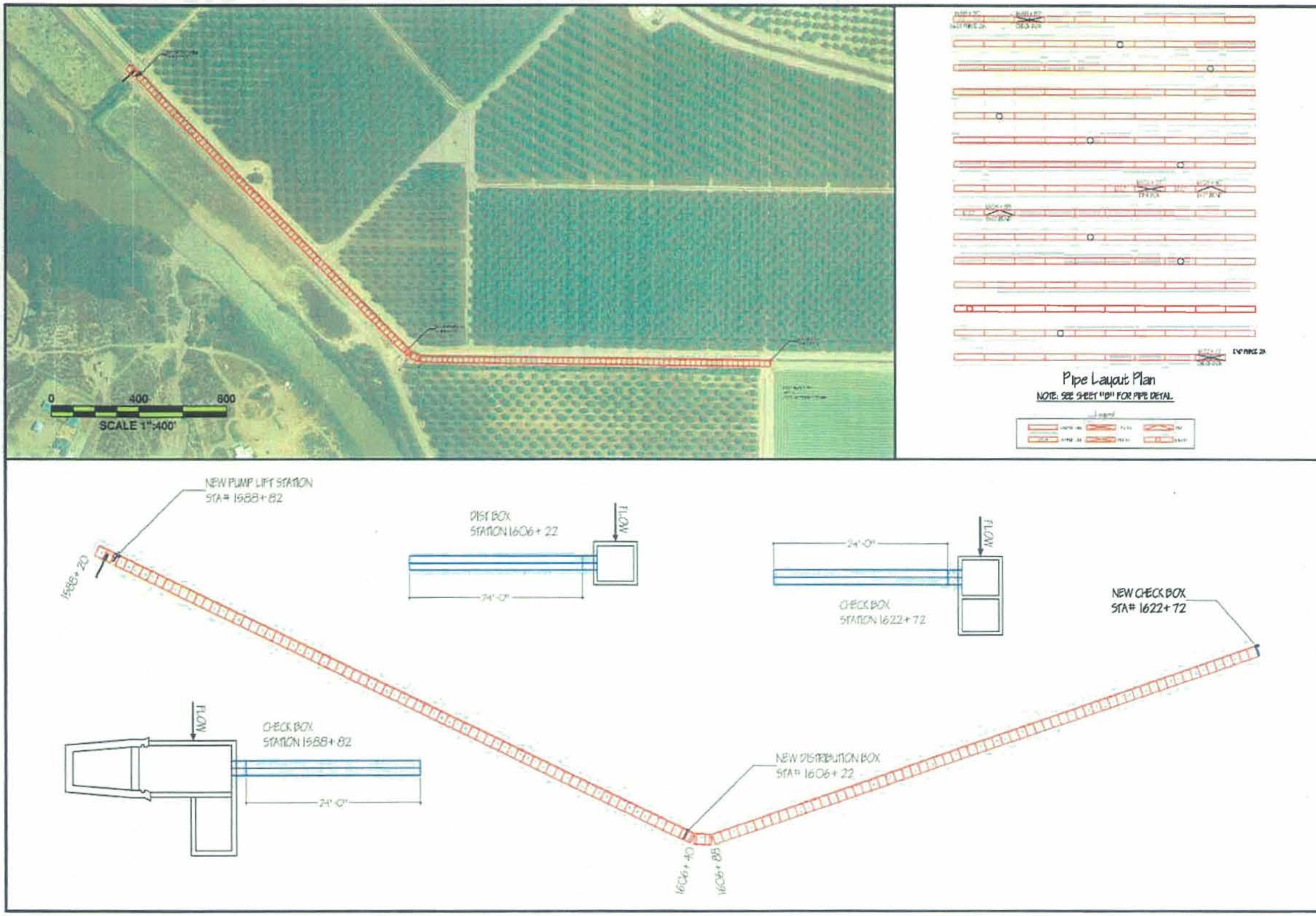
EBID JOB #	
DWG FILE	
DESIGNED	
DRAWN	
PRINT DATE	
APPROVED	

RINCON LATERAL
PIPELINE
FROM STATION# 1559+46 THRU 1582+05

REVISIONS	
DATE	REMARKS

1B

SHEET 2 OF 4



ELEPHANT BUTTE IRRIGATION DISTRICT

EBID

ENGL JOB #	
DWG FILE	
DESIGNED	
DRAWN	
PRINT DATE	
APPROVED	

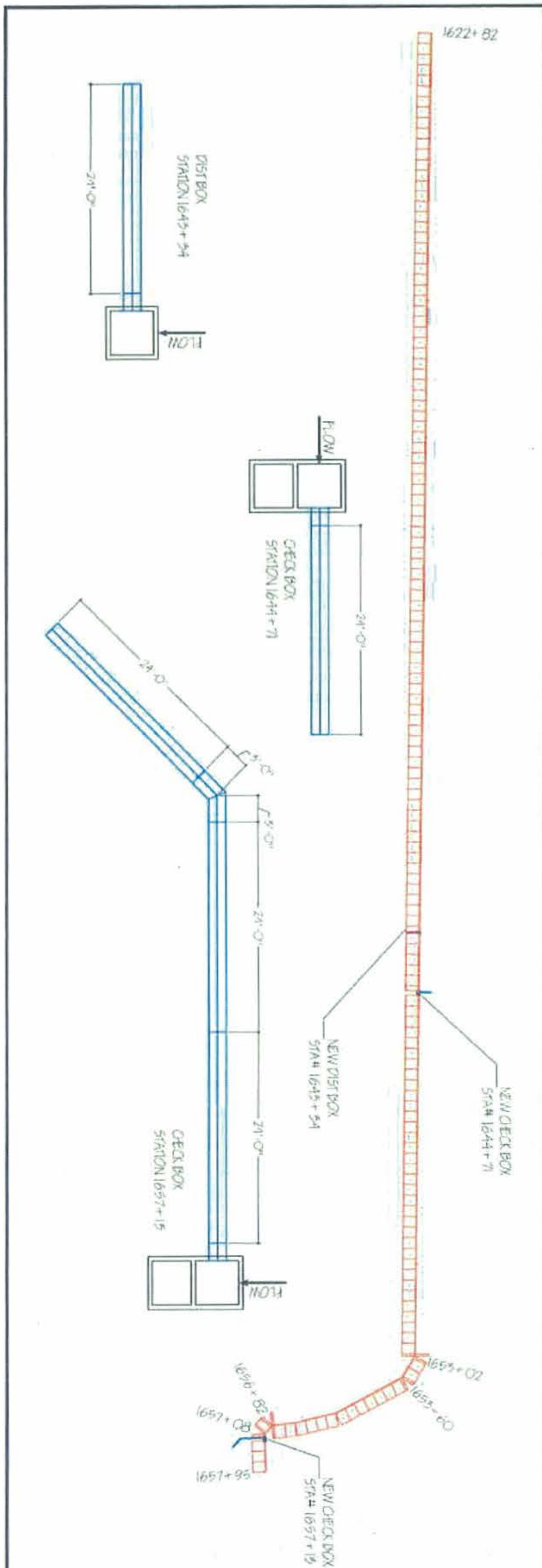
RINCON LATERAL
PIPELINE
FROM STATION# 1588+20 THRU 1622+72

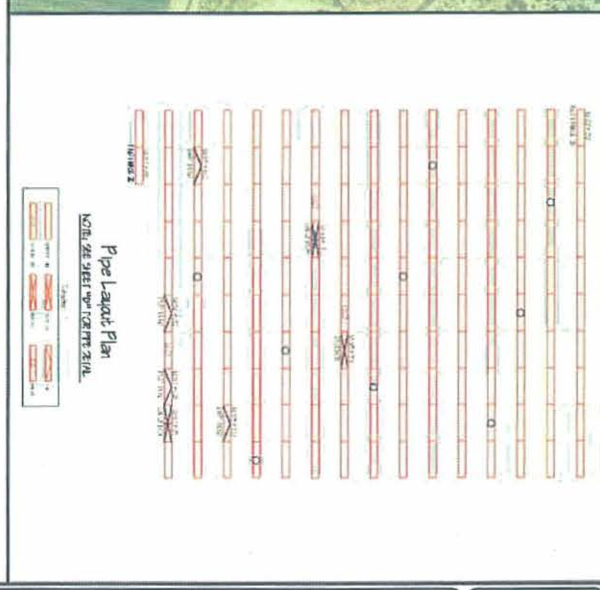
REVISIONS

DATE	REMARKS

2A

SHEET 3 OF 4





ELEPHANT BUTTE IRRIGATION DISTRICT

EBID

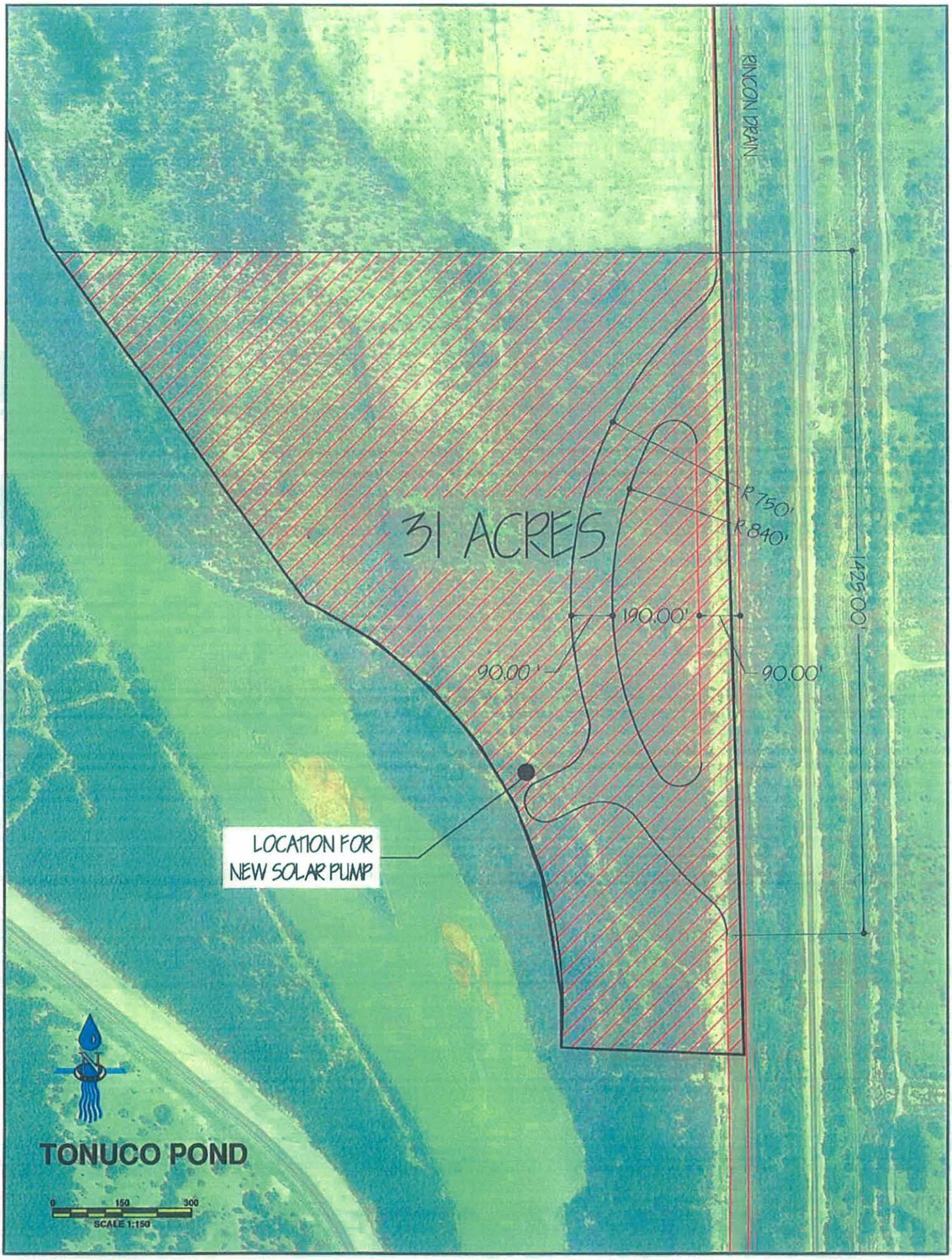
EMIL JOB #	[illegible]
DWG FILE	[illegible]
DESIGNED	[illegible]
DRAWN	[illegible]
PRINT DATE	[illegible]
APPROVED	

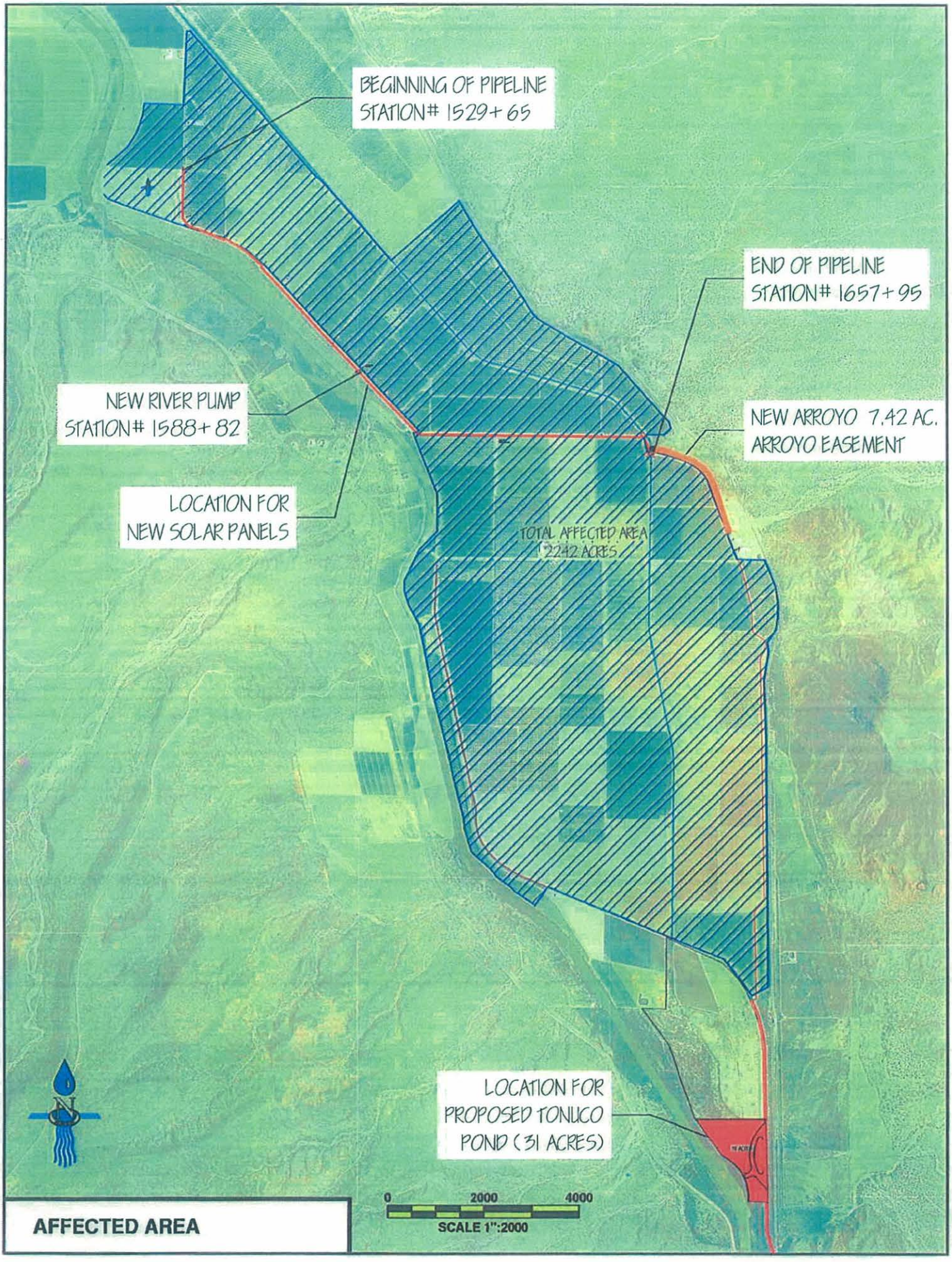
RINCON LATERAL
PIPELINE
FROM STATION # 1622+82 THRU 1657+95

REVISIONS	
DATE	REMARKS

2B

SHEET 4 OF 4


RINCON DRAIN
31 ACRES
R 750'
R 840'
190.00'
90.00'
90.00'
1425.00'
LOCATION FOR
NEW SOLAR PUMP
N
TONUCO POND
0
150
300
SCALE 1:150


BEGINNING OF PIPELINE
STATION# 1529+65
END OF PIPELINE
STATION# 1657+95
NEW RIVER PUMP
STATION# 1588+82
NEW ARROYO 7.42 AC.
ARROYO EASEMENT
LOCATION FOR
NEW SOLAR PANELS
TOTAL AFFECTED AREA
1224.2 ACRES
LOCATION FOR
PROPOSED TONUCO
POND (31 ACRES)
0
2000
4000
SCALE 1":2000
AFFECTED AREA


CARSON PROPERTY:
7.42 ACRES
RINCON DRAIN
RINCON LATERAL
RIO GRANDE
TONUCO INTERCEPTING DRAIN
LACK PROPERTY:
31 ACRES
31 ACRES
CONTRIBUTED LAND
0
1000
2000
SCALE 1:2000