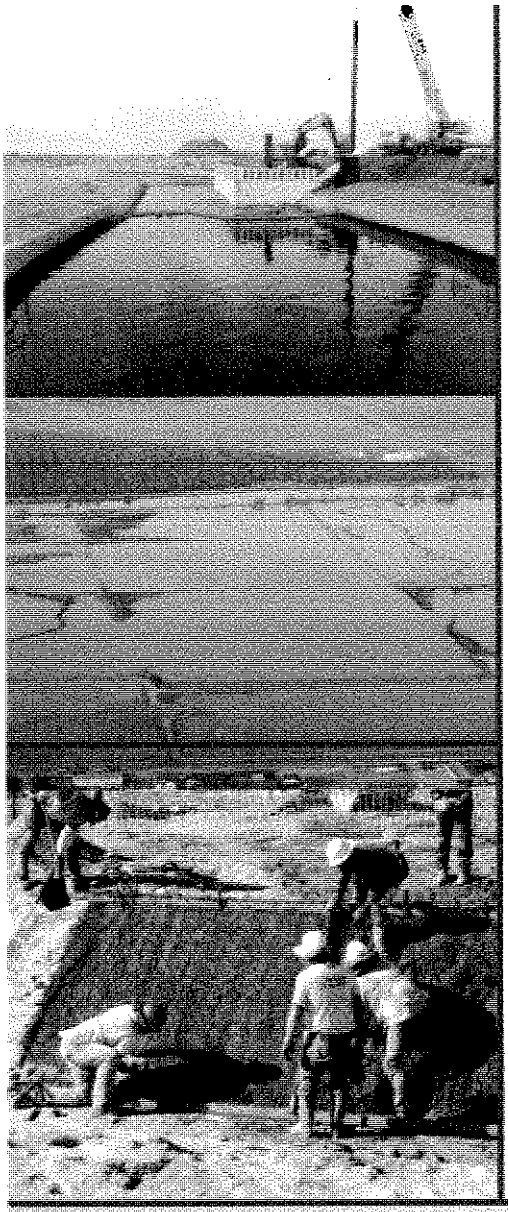


Rosedale-Rio Bravo Water Storage District

Stockdale East Groundwater Recharge Project

2016 WaterSMART Water and Energy Efficiency Grant Application
FOA No.R16-FOA-DO-004

January 2016

Stockdale East Groundwater Recharge Project

2016 WaterSMART: Water and Energy Efficiency Grant Application

FOA No. R16-FOA-DO-004

Rosedale-Rio Bravo Water Storage District
849 Allen Road
P.O. Box 20820
Bakersfield, CA 93390

Project Manager
Assistant General Manager - Engineer

Dan Bartel
P.O. Box 20820
Bakersfield, CA 93390

Phone: 661-589-6045
Fax: 661-589-1867
Cell: 661-333-8747
Email: dbartel@rrbwsd.com

Table of Contents

1. Technical Proposal

1.1 Executive Summary

Applicant Information:

January 20, 2016
Rosedale-Rio Bravo Water Storage District
Bakersfield, Kern County, California

Dan Bartel – Project Manager
Zach Smith – Technical Contributor

The Stockdale East Groundwater Recharge Project is designed to improve the overall District system efficiency by increasing the District's ability to intercept high flow surface runoff for storage within the Kern Fan area groundwater basin. This will be accomplished via three strategic project components:

1. Stockdale East Recharge Ponds (Construction of approx. 200 acres of ponds).
2. Central Intake Pumping Plant - Phase 2 (4 pump installations of approximately 140 cfs of pumping capacity to serve various recharge areas.)
3. On-Farm Irrigation Improvements - If NRCS funds are available, the District will facilitate a cost-share grant program with Natural Resource Conservation and District water-users to incentivize investments in on-farm irrigation systems.

The stored groundwater as a direct result of the Project will provide additional water to:

1. Support District water-users (agricultural, municipal, and industrial).
2. Provide enhanced protection against prolonged drought and climatic changes.
3. Reduce groundwater pumping lifts and result in energy savings.
4. Potentially support third-party banking and transfer partners.
5. Provide intermittent wetlands for wildlife environmental benefits.

This Project meets nearly ALL of the Objectives of Section I.B and ALL of the Tasks of Section III.B. of the Funding Opportunity Announcement No. R16-FOA-DO-004 by leveraging RRBWSD moneys and resources through cost sharing with Reclamation to develop projects that conserve water and energy by improving water management, creating new supplies for agricultural, municipal, and industrial users, and wildlife (including endangered species) enhancement, reducing groundwater pumping, and reducing energy use through employing high efficiency technologies.

Average annual water supply including non-Agricultural	124,000 AFY
Average annual water supply - Agricultural	108,000 AFY
Estimated water saved after the project is completed	8,700 AFY
Estimated water better managed after the project is completed	6,870 AFY
Estimated energy generated or conserved	326,000 kWh/Yr

It is expected that this program will proceed immediately upon notification of grant funding and could be completed within 15 to 18 months.

Table 1. Funding Chart

Funding Source	Funding Amount
Non-Federal Entities	
Rosedale-Rio Bravo Water Storage District	$2,911,541
Rosedale-Rio Bravo Water Storage District (in-kind)	$ 182,584
Non-Federal Subtotal	**$3,094,125**
Requested Reclamation Funding	**$1,000,000**
Total Project Funding	***$4,094,125***

1.2 Background Data

Rosedale-Rio Bravo Water Storage District (RRBWSD or the "District") is located in the southern San Joaquin Valley, immediately west of the City of Bakersfield, and has a gross area of approximately 44,000 acres (Figures 1. & 2.). The District lands identified for the spreading facility are located within the Kern River Alluvial Fan where historic runoff created an efficient aquifer system from which the District recharges groundwater so as to support groundwater pumping for agricultural, municipal, and industrial uses. The District is an independent special district, organized on August 27, 1958, under the provisions of the California Water Storage District Law (Division 14 of the Water Code of the State of California) (the "Act"). The District's boundaries encompass a portion of the City of Bakersfield. The property within the District is agricultural, municipal and industrial. Of the total 44,000 acres, approximately 28,000 acres are currently in crops, which include forage, nuts, dairy, almonds, pistachios, and vegetables. (See Appendix A for 2013 RRBWSD Crop Survey.) The balance is a mix of open ground, rural development (0.25-10 acre lots), and light industrial businesses that mainly support the agricultural and petroleum industries. These uses are served potable water by both individual and mutual domestic water wells.

In 1959, the voters within the District approved a general project consisting of the construction of recharge basins and water conveyance facilities capable of capturing water supplies and percolating those supplies into the underground aquifer for replenishment of water pumped by landowners within the District (the "Recharge Project"). The construction of the initial phases of the Recharge Project was completed in 1962. Additional improvements to the Recharge Project have been made and additional facilities and properties have been added since the original project was completed. Subsequent to the completion of construction of the Recharge Project, the District acquired a State Water Project (SWP) water supply through the Kern County Water Agency (the "Agency"). RRBWSD has also been a historic user of surplus Friant-Kern Canal flows and a user of Kern River water via its contract with the Kern County Land Company (now City of Bakersfield) to serve irrigation demands and for

groundwater recharge programs.

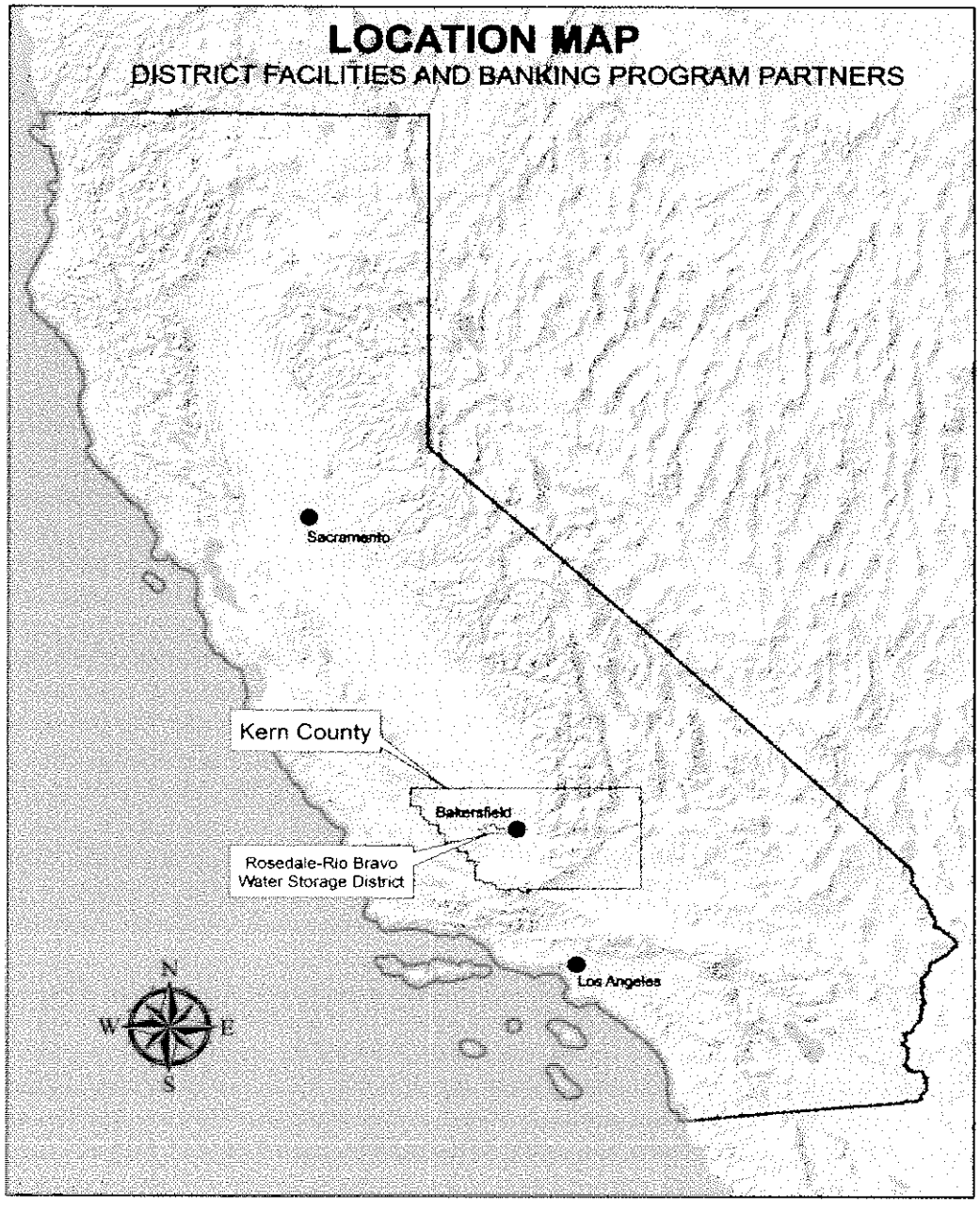


Figure 1. Project Location

The District operates a water delivery system consisting of 25 miles earthen canals, 2 miles of pipelines, check structures, pipelines, and wells all designed for the primary function of groundwater banking and conjunctive use (recharge and recovery). There are

approximately 20 connections to landowner irrigation systems that are used for in-lieu groundwater recharge purposes. The District acquires wet-year supplies via various contracts and banking programs which require that a portion of the supplies are returned in dry years. Conveyance systems for banking return are a mix of pipelines and earthen canals, thus water evaporation and seepage reduces the project's return capabilities. The District and its landowners are served by the Pacific Gas and Electric Company; the vast majority of energy used for groundwater recovery and conveyance is electrical based.

The District has developed and enjoys partnerships with many different state, federal, and local entities to help improve water management and meet future water demand needs. Currently and historically, RRBWSD has worked with the U.S. Department of the Interior, Bureau of Reclamation (USBR) and Fish and Wildlife Service to provide water to the Kern National Wildlife Refuge (KNWR) to the northwest of the District and to obtain water from the Central Valley Project (CVP). RRBWSD also partners with multiple Federal Friant-Kern water agencies for mutually beneficial recharge and recovery projects, namely: Arvin-Edison WSD, Kern-Tulare WD, and Delano-Earlimart ID. Below is a list of the various contracts involving RRBWSD and Federal agencies:

KNWR Purchase & Conveyance Agreements
- Year 2007

CVP Short-Term/Temporary Water Service Contracts (non-CVP Contractor)
- Year 1965, No. 14-06-200-769A
- Year 1973, No. 14-06-200-4032
- Year 1973, No. 14-06-200-229A
- Year 1973, No. 14-06-200-7228A
- Year 1973, No. 14-06-200-4162A
- Year 1978, No. 14-06-200-229A
- Year 1993, No. 3-07-20-W1058
- Year 1995, No. 5-07-20-W12
- Year 2001, No. 01-WC-20
- Year 2003, No. 03-WC-20-2654
- Year 2011, No. 11-WC-20-0090
- Year 2011, No. 11-WC20-0104

Federal Exchange and Banking Agreements
- Arvin-Edison WSD, 1997, 2003, 2009, 2011, 2012, 2013
- Delano-Earlimart ID, 2009
- Kern-Tulare WD, 2001, 2004, 2005, 2007

The District recently acquired approximately 230 acres of land, known as Stockdale East, in the Kern Fan Area of the southern San Joaquin Valley. It is located approximately six miles west of Bakersfield. The property has soils favorable to groundwater recharge activities and located adjacent to the Cross Valley Canal which gives it the unique opportunity to receive state, federal, and local water supplies, as indicated in Figure 2.

Under this proposal, the District seeks to improve its ability to absorb wet year supplies and increase its flexibility or "timing" ability to absorb surface water supplies. The District's existing facilities to deliver supplies to agricultural uses will be complemented with facilities to accept with intermittent groundwater recharge via the construction of the necessary water conveyance and recharge ponds.

The District contracts with the state of California for a water supply from the Sacramento/San Joaquin Delta ("Delta"). Surface supplies have become increasingly less reliable south of the Delta. For instance, while the District pays for 100% of the water contracted, nearly $3 million per year, the District receives on average only 60% of the water.

In an effort to ensure stable sources of water supply due to environmental, climatic, and legal restrictions in the Delta, the District is looking to develop a series of projects intended to acquire and store additional water at a reduced overall cost. Two components of their overall project improvements are described in this proposal, which is to add new spreading ground capacity and additional pumping capacity to conveyance for delivery of wet year water to spreading grounds. In order to support recharge of wet year supplies, two key added components of this project are to be constructed: 1) Stockdale East Recharge Ponds and 2) added pumping capacity to the Central Intake Pumping Plant - Phase 2.

These improvement complement the District's overall water supply improvements and their response to the severe drought impacting western states. In March 2014, the District declared a drought emergency and has initiated Drought Relief Projects, including expediting the construction of 11 recovery wells and conveyance facilities to provide for emergency water needs. The proposed project components of this proposal are intended to improve absorptive capacity and optimize these recovery activities going forward with the addition of the ability to absorb wet year water supply.

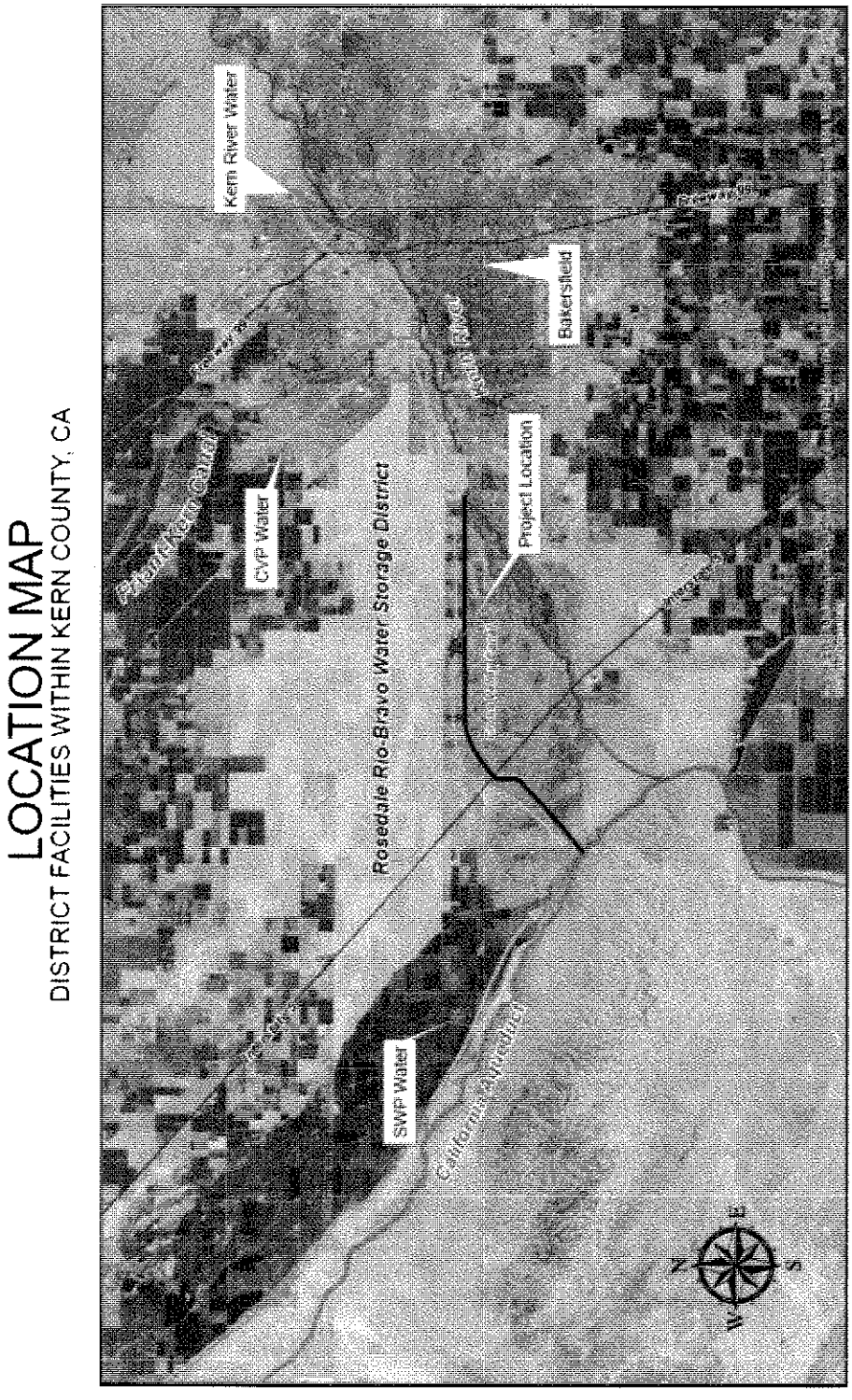


Figure 2. Component Locations and Source of Surface Water

1.3 Technical Project Description

The Stockdale East Groundwater Recharge Project is designed to improve overall District system efficiency by increasing the District's ability to intercept high flow surface runoff for storage within the Kern Fan area groundwater basin. This will be accomplished through three strategic project components:

1. Stockdale East Recharge Ponds (Construction of approx. 200 acres of ponds).
2. Central Intake Pumping Plant - Phase 2 (4 pump installations of approximately 140 cfs of pumping capacity to serve various recharge areas.)
3. On-Farm Irrigation Improvements - If NRCS funds are available, the District will facilitate a cost-share grant program with the Natural Resource Conservation Service (NRCS) and District water-users to incentivize investments in on-farm irrigation systems.

The stored groundwater as a direct result of the Project will provide additional water to:

1. Support District water-users (agricultural, municipal, and industrial).
2. Provide enhanced protection against prolonged drought and climatic changes.
3. Reduce groundwater pumping lifts and resulting energy savings.
4. Potentially support third-party banking and transfer partners.
5. Provide intermittent wetlands for wildlife environmental benefits.

This Project meets nearly *all* of the Objectives of Section I.B and *all* of the Tasks of Section III.B. of the Funding Opportunity Announcement No. R16-FOA-DO-004 by leveraging RRBWSD money and resources by cost sharing with Reclamation for developing project components that conserve water and energy by improving water management, developing new supplies for agricultural, municipal, and industrial users, and wildlife (including endangered species) enhancement, reducing groundwater pumping, and reducing energy use through employing high efficiency technologies.

For project implementation, RRBWSD is taking a five step approach to handle the major tasks associated with the project:

1. **Feasibility Study** – RRBWSD technical staff and consultants, have evaluated the feasibility of the projects as shown on the Project Summary Matrix and Water Management Program Score and B/C ratios in Appendix B and in reports and technical memos in Appendix D, E, and F. The evaluation includes considering issues such as water system delivery effectiveness, construction reasonableness, environmental impacts and cost/benefit ratios.

2. **Environmental and Regulatory** – RRBWSD will take the necessary measures to satisfy federal and state environmental requirements and regulations. Using the environmental information obtained from various studies, required steps will be taken to meet CEQA and/or NEPA compliance and all necessary permit applications will be submitted. Refer to Sections 2. and 3. for further information on environmental and regulatory compliance.

3. **Design** - This task includes the preliminary and final designs of the facilities.

4. **Installation** – This task includes procurement of materials, contractor bidding and selection (if necessary), and construction.

5. **Inspection and Testing** – Upon completion of construction, a detailed inspection will occur, equipment training, testing and calibration, as well as a performance evaluation will be followed by a final report to provide an account of project progression and expenditures. In addition, any state and federal required project completion reports will be provided to the respective agencies. Ongoing monitoring of project performance and evaluation will be conducted to determine actual water conservation and energy benefits.

As with most major projects, many aspects or details from each of the listed steps require parallel progression and overlap is necessary to produce an efficient project schedule. It is estimated that the Project will be completed in approximately 15 to 18 months, however, reimbursement for expenses incurred may occur over 24 months. Please see Appendix C for a preliminary Project Schedule.

This project consists of the following specific components:

1. **Stockdale East Recharge Ponds** – RRBWSD seeks to construct approximately 200 acres of recharge ponds via the placement of 203,000 CY of compacted levees that are approximately 2-5 feet in height. Upwards of 19,000 acre-feet per year (AFY) (typically 3 years in 10) of recharge water will be conveyed from pond to pond via 10 inter-basin check structures. See Figure 3. for component location.

2. **Central Intake Pumping Plant - Phase 2** – RRBWSD is currently preparing to construct a Central Intake Pipeline Facility as part of its Emergency Drought Relief Project. This includes a 48-72 inch pipeline that will offer RRBWSD the ability to network various groundwater recharge and conveyance facilities in order to maximize opportunities to store in the groundwater basin available runoff during wet years. In order to deliver local, state and federal water for recharge purposes to the Stockdale East property and other existing recharge projects (Superior Recharge Ponds and Goose Lake Slough), 4 low lift pumps (total of 140 cfs capacity) along with high efficiency motors, variable frequency drives (VFDs), SCADA control units, flow meters, and discharge piping must be added to the Pumping Plant. Upwards of 19,000 AFY of recharge water will be conveyed to the Stockdale East Recharge Ponds and upwards of 30,000 AFY could be conveyed to the Superior Recharge Ponds and Goose Lake Slough (typically 3 years in 10), 10,000 AFY of which would be new recharge and 20,000 AFY would be water better managed via this preferred route. See Figure 3. for component locations

3. **On-Farm Irrigation Improvements** – In addition to chronic water supply shortages from the State Water Project, which is a supplemental source for the local groundwater basin, increasingly restrictive waste discharge regulations instituted by the Regional Water Quality Control Board – Central Valley are driving the District growers towards considering additional irrigation systems improvements in order to reduce over-irrigation and the leaching of nutrients and pesticides to groundwater. To that end, the District will cooperate with the NRCS to facilitate on-farm cost-share programs and projects that will better manage irrigation water and reduce deep percolation. In January 2016, the District sent letters to landowners to gather interest in this program. The District also intends to provide information packages, add information to its website, and host meetings with the landowners. Program goals and objectives along with on-farm implementation projects will be jointly developed with the NRCS and RRBWSD. Once these implementation projects are finalized, the NRCS will evaluate and facilitate cost-share agreements with the water-users and ensure that the proposed on-farm improvements are consistent with the goals and objectives.

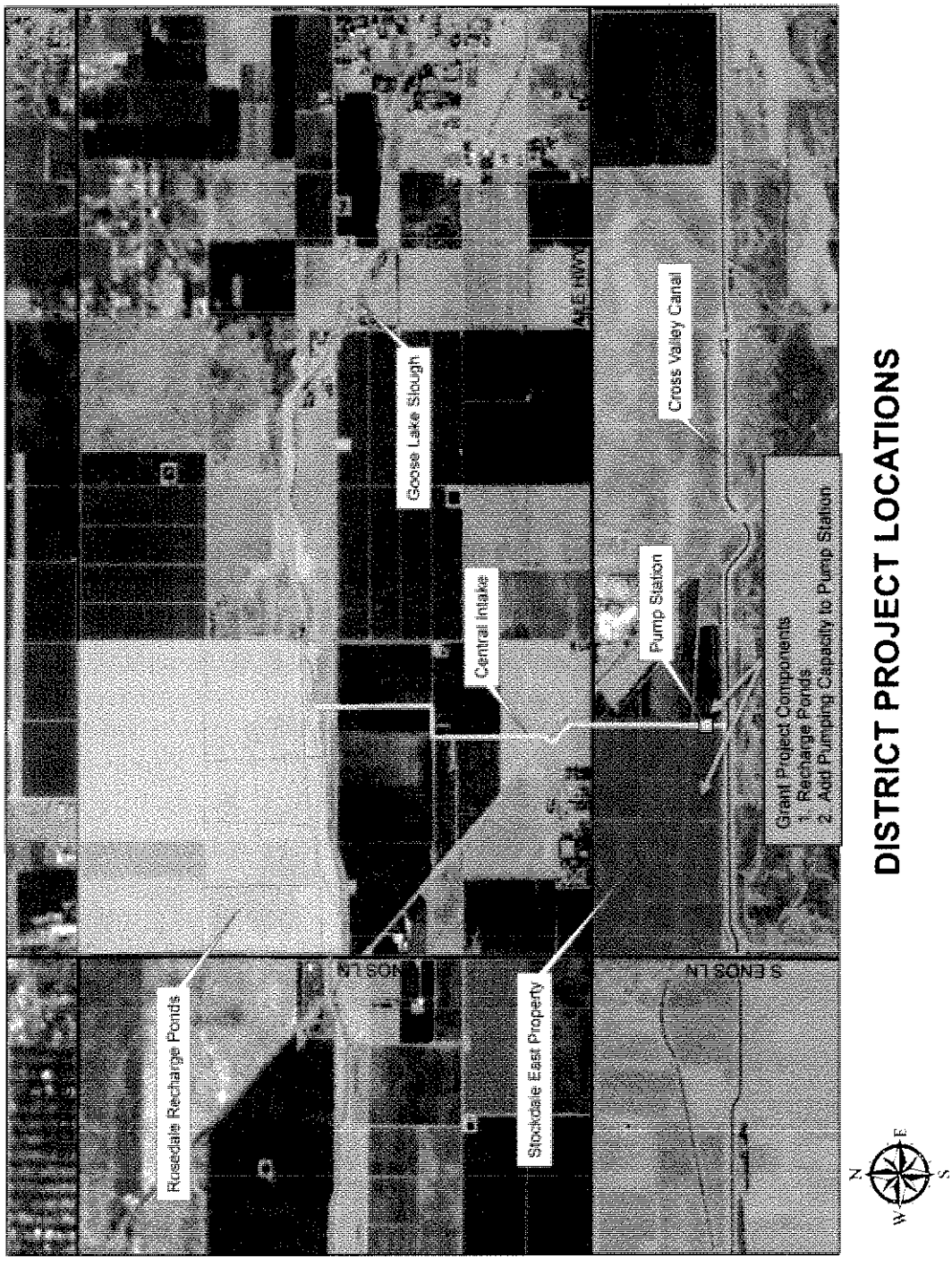


Figure 3. District Project Component Locations

1.4 Evaluation Criteria/Performance Measures

The Project proposes to save **8,700 AFY** by means of newly constructed recharge ponds and better manage approximately **6,870 AFY** through added pumping capacity and newly installed high efficiency VFD/SCADA equipped pumps.

1.4.1 Water Conservation – *Evaluation Criterion A*

Quantifiable Water Savings - ***Subcriterion No. A.1***

Describe the amount of water saved. *For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project. Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations.*

In addition, all applicants should be sure to address the following:

- *What is the applicant's average annual acre-feet of water supply?*
- *Where is the water that will be conserved currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?*
- *Where will the conserved water go?*

The project will save a total of **8,700 AFY by conserving groundwater directly as a result of the recharge of wet year water by this project.** In addition, the added pumping capacity at the pumping plant will allow *6,000 AFY* to be better managed plus *870 AFY* of water to be better managed by equipping the pumping plants with variable frequency drives and SCADA systems. Each of these items are separately calculated and explained in their relative sections below.

RRBWSD's average annual water supply (1993-2013) for agricultural use is about 108,000 AFY and this use is met from varoius sources of water (Kern River, SWP, CVP, banked groundwater, exchanges, Safe Yield, and precipitation). Because the District operates functionally as a groundwater replenishment district, all sources are counted. The conserved water from this proposed project will be stored in the groundwater basin and will help meet dry-year program demands.

Groundwater Recharge:
The District currently operates five different direct recharge pond areas in order to support local groundwater pumping. To help augment these operations, RRBWSD proposes to construct approximately 200 acres of additional recharge ponds near the intersection of Highway 43 and Stockdale Highway to be called the Stockdale East Recharge Project. This area has long been known to have excellent groundwater recharge characteristics and is conveniently located to the Cross Valley Canal which allows for delivery of local, state, and federal water to and return from the property. Long term recharge rates are expected to be 0.28 AF/Acre/Day (explained in the EIR for this project), thus this property would be able to deliver up to 19,000 AF into the basin

during each wet year. Below is an excerpt from the EIR for this project which further explains the derivation of the recharge rate.

Figure 4. EIR Excerpt for Groundwater Recharge

2 Evaluation of Annual Recharge Capacity at the Sites

For this analysis, annual recharge capacity is defined as the maximum volume of water that each Project facility can infiltrate into the subsurface in a year (see Table 1). The recharge capacity was estimated based on the size of the facilities (wetted area), the time available to accept water (assumed to be 365 days), and the infiltration rate. For Stockdale West, the wetted area is estimated to be 265 acres based on design drawings of the basins as provided by IRWD. For Stockdale East, the wetted area is estimated to be 186 acres, which is 80 percent of the total area of the property.

Infiltration rates for the Stockdale West and Stockdale East facilities were estimated based on recharge operations data for the adjacent Strand Ranch Integrated Banking Project Facility. In calendar year 2011, a total of 37,638 acre-ft of water was delivered to the Strand Ranch Integrated Banking Project recharge basins (17,500 acre-ft for IRWD and 20,138 acre-ft for RRBWSD). In many of the months, the basins were filled to capacity. The lowest infiltration rate necessary to accommodate the delivered water during months when the basin capacity (including surface storage) was maximized was 0.28 ft/day. This infiltration rate was used as a basis for estimating the recharge capacity at the Stockdale West and Stockdale East facilities. This infiltration rate is consistent with infiltration rates observed at other recharge basins in the area (TH&Co, 2011).

Using the infiltration rate estimated from 2011 Strand Ranch Integrated Banking Project operations and the wetted areas for the facilities, as described above, the potential annual recharge estimates for Stockdale West and Stockdale East are approximately 27,100 acre-ft/yr and 19,000 acre-ft/yr, respectively (see Table 1).

Hydrology shows that the region experiences wet years sufficient to provide supplies to the project about every three in ten years. That would result in an average of additional *5,700 AFY* (0.3 x 19,000 AF) stored groundwater. Approximately 50 cfs of the Central Intake Pumping Plant – Phase 2 would be dedicated to serving this site.

An additional 90 cfs would be included to offer capacity to deliver state and federal water to existing recharge areas located approximately 1.5 miles north of the site (Superior Basins). This would give added access to recharge supplies and potentially add up to 10,000 AF into the groundwater basin during each wet year. Using the same wet-year probability, this would result in an average of *3,000 AFY* (0.3 x 10,000 AF) of additional stored groundwater. Therefore, a total of **8,700 AFY** would be conserved as a direct result of the project.

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

As explained previously, water savings were calculated based on an estimated long term recharge rate of 0.28 AF/Acre/Day and on hydrologic trends showing that the District experiences a wet year about every three in ten years. Because the additional recharge to

both areas would apply primarily in wet years, the savings are calculated based on this assumption of about 30% wet years in ten years.

(b) Describe the source of the water to be used for recharge and what percentage of the recharged water is going to be available for use and how it will be used. Describe how this supply of water will offset other supplies.

Surface water that is available during wet years from the SWP, CVP, or Kern River supplies is delivered to the District from the Kern River and the Cross Valley Canal. The added pumping capacity at the Pumping Plant near the Cross Valley Canal will allow for delivery to the new spreading grounds and two existing spreading grounds within the District.

(c) If water savings are based on reduced surface water storage evaporation, provide calculations for reduced evaporation losses.

Water savings are not based on reduced surface water storage evaporation since the water saved is wet year surface water delivered to groundwater recharge.

(d) If water savings are based on recharge from existing surface runoff, provide calculations quantifying the estimated increased deep percolation amount.

Water savings are based on recharge of total available volume over time using recharge rates representative of existing, established spreading basins that have been in use in the Kern Fan for decades.

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

Water delivered to the new or existing spreading basins will be metered with annual quantities reported.

Water Better Managed:
There are times that RRBWSD conveys water in the Cross Valley Canal up three pumping plants to the east in the Cross Valley Canal and then back west to the Superior Basins. Use of this route requires an additional 45 feet of elevation lift, which can be eliminated once the pumping capacity is added to the new pumping plant. It is estimated that the new pumping plant will average **6,000 AFY** of better managed operations, thus avoiding 40 feet of the additional lift via the other delivery route and will free up Cross Valley Canal conveyance capacity during the wet years for use by other recharge operations.

SCADA and Automation:
RRBWSD has identified the benefit of equipping the pumps with variable frequency drives (VFD's) and SCADA systems to reduce system spillage caused by the traditional method of utilizing pumps equipped with bypass valve. It is expected that without

VFD/SCADA systems 10% of the pumped flow would be bypassed and spilled back into the system. The incorporation of VFD/SCADA would reduce needlessly pumping and spilling an additional **870 AFY** (0.10 x 8,700 AF of added water to recharge ponds).

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

The water saving estimate is described in the Technical Memorandum in Appendix E. Fitting the pumping plant with VFDs and SCADA systems replaces the traditional manual pump back bypass system, which are known by the District operators to require a spill back of 10% when operating.

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

As stated in the Appendix E Tech Memo, the estimated losses have been determined through operations of manual bypass systems.

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

Project improvements are for conveyance and delivery of wet year water to spreading grounds and will be available for direct farm deliveries at a later time.

(d) Will canal seepage be reduced through improved system management? If so, what is the estimated amount and how was it calculated?

Canal seepage reduction is not related to these system improvements.

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

The District will measures the water flow through the pumps and will monitor the time of use for the pumps at the pumping plant. Use of VFDs will eliminate the bypass of water.

Percentage of Total Supply - ***Subcriterion No. A.2***

As stated in Subcriterion No. A.1 above, the District's average annual water supply is 108,000 AFY and water savings from the project are estimated at 8,700 AFY. The percentage of total water supply conserved (calculations shown below) is estimated to be **8.1%.**

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Annual Water Supply}}$$

$$\frac{8{,}700 \text{ AFY}}{108{,}000 \text{ AFY}}$$

= 8.1% water conserved

Also stated above, the District can better manage 6,000 AFY through the new pumping plant plus 870 with the added VFDs and SCADA, which is 6.4% of the total water supply.

$$\frac{\text{Estimated Amount of Water Better Managed}}{\text{Average Annual Water Supply}}$$

$$\frac{6{,}870 \text{ AFY}}{108{,}000 \text{ AFY}}$$

= 6.4% water better managed

1.4.2 Energy-Water Nexus – Evaluation Criterion B

The Project proposes to save **344,000 kWh or $52,000** each year by means of improved system efficiencies by implementing VFD/SCADA technology and reducing total pump lift via a more direct delivery via the Central Intake Facility versus the Cross Valley Canal.

Implementing Renewable Energy Projects Related to Water Management and Delivery – ***Subcriterion No. B.1***
The project does not include construction or installation of renewable energy components, and therefore this Subcriterion does not apply.

Increasing Energy Efficiency in Water Management - ***Subcriterion No. B.2***
Describe any energy efficiencies that are expected to result from implementation of the water conservation or water management project (e.g., reduced pumping).

- *Please provide sufficient detail supporting the calculation of any energy savings expected to result from water conservation improvements. If quantifiable energy savings are expected to result from water conservation improvements, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.*
- *Please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements?*
- *Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.*
- *Does the calculation include the energy required to treat the water?*
- *Will the project result in reduced vehicle miles driven, in turn reducing carbon emissions? Please provide supporting details and calculations. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).*

Variable Frequency Drive/SCADA Units – As explained above, RRBWSD has identified the potential benefit of equipping the pumps with VFDs and SCADA systems

to reduce system spillage caused by the traditional method of utilizing pumps equipped with bypass valve. It is expected that without VFD/SCADA systems 10% of the pumped flow would be bypassed and spilled back into the system and energy wasted. The incorporation of VFD/SCADA would reduce needlessly pumping and spilling an additional 870 AFY. Resultant annual energy savings based on energy intensity would be **18,000 kWh or $2700** each year. See Appendix E for conversions and technical details.

Improved Conveyance Route – By pumping and conveying water via the Central Intake Facility instead of the Cross Valley Canal, 40 feet of elevation head is eliminated. It is expected that 6,000 AFY would be conveyed via this route instead of the traditional Cross Valley Canal route and its three required pumping plants. With the utilization of this improved route we would reduce our annual energy usage at this site by at least **326,000 kWh or $49,000** each year. See Appendix E for technical details.

1.4.3 Benefits to Endangered Species – *Evaluation Criterion C*

For projects that will directly benefit federally-recognized candidate species, please include the following elements:

- *What is the relationship of the species to water supply?*
- *What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?*

For projects that will directly accelerate the recovery of threatened or endangered species or address designated critical habitats, please include the following elements:
(1) How is the species adversely affected by a Reclamation project?
(2) Is the species subject to a recovery plan or conservation plan under the ESA?
(3) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

In normal rainfall years, water supply operations in recharge ponds provide water and co-aquatic habitat for native and non-native species. The Kern Water Bank, which is located adjacent to the Stockdale East Project, has identified federally-listed species on their property including the *San Joaquin kit fox,* the *giant kangaroo rat,* the *Tipton kangaroo rat,* and the *San Joaquin wooly-threads*, all of which have recovery plans under the ESA. These species and their habitats are impacted during dry years when water is lacking. Impacts to aquatic species are migration, behavior changes and death, while wildlife becomes concentrated, resulting in competition for resources. The proposed recharge pond and pumping plants would increase the availability of water during dry years, directly benefiting the aforementioned endangered species. Operation of groundwater recharge ponds provide intermittent wildlife habitat during wet and drought cycles.

1.4.4 Water Marketing – Evaluation Criterion D

Briefly describe any water marketing elements included in the proposed project. Include the following elements:

- *Estimated amount of water to be marketed*
- *A detailed description of the mechanism through which water will be marketed (e.g., individual sale, contribution to an existing market, the creation of a new water market, or construction of a recharge facility)*
- *Number of users, types of water use, etc. in the water market*
- *A description of any legal issues pertaining to water marketing (e.g., restrictions under Reclamation law or contracts, individual project authorities, or State water laws)*
- *Estimated duration of the water market*

The District has developed and enjoys partnerships with many different state, federal, and local entities to help improve water management and meet future water demand needs. The District participates in a number of water transfer, banking and exchange programs. These contract relationships vary from 1-30 year programs and offer supplies for urban and agricultural uses. A portion of conserved water from this program could result in increased supplies or flexibility for these and new programs. Currently and historically, RRBWSD has worked with the U.S. Department of the Interior, Bureau of Reclamation (USBR) and Fish and Wildlife Service to provide water to the Kern National Wildlife Refuge (KNWR), to the north of the District and to obtain water from the Central Valley Project. RRBWSD also partners with multiple Federal Friant-Kern water agencies for mutually beneficial recharge and recovery projects, namely: Arvin-Edison WSD, Kern-Tulare WD, and Delano ID. It also has banking and transfer projects with Buena Vista WSD, Coachella Valley WD, Irvine Ranch WD, and Castaic Lake Water Agency.

1.4.5 Other Contributions to Water Supply Sustainability – *Evaluation Criterion E*

Addressing Adaption Strategies in a WaterSMART Basin Study - ***Subcriterion No. E.1***

The Project is not yet within a WaterSMART Basin Study area. Considering the water supply challenges that our basin faces, the District has been advocating such a process and leading an effort to employ one. Many of the aspects of this project would undoubtedly be components of improved water management that a study would promote. Currently 19 local water agencies and/or entities have formed a joint powers authority and are discussing and funding a water basin-wide management plan process (Kern Groundwater Authority) to deal with sensitive common concerns such as basin overdraft, increased litigation, new state legislation, reduced imported SWP and CVP supplies, effects of climate change, and increased competition for groundwater.

Expediting Future On-Farm Irrigation Improvements - ***Subcriterion No. E.2***

If the proposed projects will help expedite future on-farm improvements please address the following:

- *Include a detailed listing of the fields and acreage that may be improved in the future.*
- *Describe in detail the on-farm improvements that can be made as a result of this project. Include discussion of any planned or ongoing efforts by farmers/ranchers that receive water from the applicant.*
- *Provide a detailed explanation of how the proposed Water SMART Grant project would help to expedite such on-farm efficiency improvements.*
- *Fully describe the on-farm water conservation or water use efficiency benefits that would result from the enabled on-farm component of this project. Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*
- *Projects that include significant on-farm irrigation improvements should demonstrate the eligibility, commitment, and number or percentage of farmers/ranchers who plan to participate in any available NRCS funding programs. Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*
- *Describe the extent to which this project complements an existing NRCS-funded project or a project that either has been submitted or will be submitted to NRCS for funding.*

Any water conservation project that is employed, as we have described, would result in reduced dependence on groundwater and would reduce overdraft concerns and impacts. The District believes that not only is water supply development a key to a sustainable future water supply, but so is water conservation, hence the development of this critical project. The District firmly believes, as it employs and promotes its water and energy conservation projects, that its landowners may also follow suit and has been developing its own strategic plan and wants to promote itself as a leader in the water management industry and likewise lead its water users and others to a more sustainable water management plan.

In addition to chronic water supply shortages from the State Water Project, which is a key supplemental source for the local groundwater basin, the growing waste discharge regulations instituted by the Regional Water Quality Control Board – Central Valley is driving the District growers towards considering additional irrigation systems improvements in order to reduce over-irrigation and the leaching of nutrients and pesticides to groundwater. To that end the District will cooperate with the Natural Resources Conservation Service (NRCS) to facilitate and promote on-farm cost-share programs and projects that will better manage irrigation water and reduce deep percolation. The District has sent out a letter to growers and will produce and send out information packages, add information to its website, and host meetings with the landowners. Program goals and objectives will be jointly developed with the NRCS and RRBWSD. Once these goals and objectives are finalized the NRCS will evaluate and facilitate cost-share agreements with the water-users and ensure that the proposed on-farm improvements are consistent with the

goals and objectives. Based on communications with growers the District, estimates that up to **2,000 to 5,000 acres** of irrigation land within the District (5-10%) would enroll in such a program. Specific improvements could include irrigation system evaluations, tailwater return systems, micro-irrigation systems, pipelines, center pivots, gated pipe, hand move sprinklers, etc.

Other Water Supply Benefits - ***Subcriterion No. E.3***

Will the project make water available to alleviate water supply shortages resulting from drought?

- *Explain in detail the existing or recent drought conditions in the project area. Describe the impacts that are occurring now or are expected to occur as a result of drought conditions.*
- *Describe the severity and duration of drought conditions in the project area.*
- *Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.*
- *Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought.*

The District relies on both SWP, CVP and local water supplies to support groundwater pumping by its users. California has been in severe drought conditions since 2011 and as such, surface supplies from these sources have resulted in **"zero"** acre-feet available to the District for groundwater replenishment from 2013 to 2015. This has resulted in groundwater level declines of 85-165 feet in much of the District.

In response to the severe drought impacting western states in March of 2014, the District declared a drought emergency and has initiated a Drought Relief Project which expedites the construction of 11 recovery wells and conveyance facilities to provide for emergency water needs. In an effort to ensure stable sources of water supply due to environmental, climatic, and legal restrictions in the Delta, the Drought Relief Project proposed a series of projects intended to acquire and store additional water at a reduced overall cost. In order to support and optimize these recovery activities going forward in response to the drought, the Stockdale East Recharge Ponds and Central Intake Pumping Plant - Phase 2 should be constructed. As surface water supplies decrease in response to drought, the District will increase reliance on groundwater, continuing decline of groundwater levels. The components of this project will provide precious additional groundwater recharge storage capacity to more effectively capture wet-year supplies to hedge against future drought conditions when they come.

Will the project make water available to address a specific concern? For example:

- *Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?*

Yes. The project will allow for capture of excess surface waters during wet years for replenishment of the groundwater basin and use of water during dry years when water supplies are limited.

- *Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.*

The District is entitled to contracted amounts of surface water from the State Water Project and also pulls water from the Kern River. As climate change impacts heighten, any reduction in the timing and availability of SWP supplies could have negative impacts on the water supply of the District. Local flows from the Kern River can also be reduced by changes in snow pack in the Sierra Nevada and other regional mountain ranges. Reductions in surface water supplies would force the District to rely more heavily on local groundwater, lowering groundwater levels. Further, reductions in local surface water supplies would reduce natural recharge, thus exacerbating groundwater levels.

- *Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?*

Yes. Without the project, the District faces the potential to exacerbate water supplies as a result of climate change. Lowered groundwater levels affect the ability of groundwater wells to reach groundwater, affect water quality, and limit groundwater availability. The project allows for replenishment of the groundwater basin during wet years for the purpose of heightened groundwater reliance during dry years.

- *Will the project make additional water available for Indian tribes?*

The project will not make additional water available for Indian tribes.

- *Will the project make water available for rural or economically disadvantaged communities?*

The project will conserve groundwater by adding wet year supplies that will enhance the groundwater available for rural or economically disadvantaged communities.

- *Does the project promote and encourage collaboration among parties?*

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act. The Governor's signing message states "a central feature of these bills is the recognition that groundwater management in California is best accomplished locally". The intent of the Groundwater Management Act is to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions and to provide a methodology for developing a Groundwater Management Plan. This District is looking to further develop additional groundwater recharge projects such as this, which provide a sustainable water supply for its customers. Regional climate variation (prolonged wet/drought cycles) and

Sacramento Delta environmental pumping restrictions have led to critical water supply shortages in Kern County which has led to litigation over groundwater pumping impacts. Further developing our local ability to recharge abundant wet-year supplies would help mitigate the issues moving forward. Development of groundwater banking programs with other overlying agencies, including Arvin-Edison WSD, Kern Tulare WD, Buena Vista WSD, and Delano-Earlimart ID, will involve cooperation among the agencies to ensure that the programs are beneficial to the agencies involved and the groundwater basin.

- *Will the project increase awareness of water and/or energy conservation and efficiency efforts?*

    - *Will the project serve as an example of water and/or energy conservation and efficiency within a community?*

The project would boost conservation efforts exemplified by the District's existing recharge ponds, by adding additional recharge pumps, efficiency technologies, and more direct delivery systems. These efforts assist in maximizing conservation and efficiency within the District as well as the overlying communities on the Kern Fan area groundwater basin.

    - *Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?*

The Project components will increase the capability of future water conservation or energy efficiency efforts for use by other districts who may enter third-party use agreements to store surface water in the groundwater basin for later use.

    - *Does the project integrate water and energy components?*

Yes. The replenishment of the groundwater basin will not only conserve water, but will reduce well energy of having to extract groundwater at lower levels, which may occur without implementation of the project. The installation of VFD and SCADA technologies would reduce excess pumping and spills. Energy would also be minimized by reducing total pump lift via a more direct delivery via the Central Intake Facility versus the Cross Valley Canal.

1.4.6 Implementation and Results – *Evaluation Criterion F*

Project Planning - ***Subcriterion No. F.1***

Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study? Provide the following information regarding project planning:

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

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

The District has provided much leadership on a number of basin planning efforts geared towards a more holistic water management strategy. These include the Kern Groundwater Authority, Kern Fan Monitoring Committee, Semitropic Banking Project Committee, Kern Integrated Regional Water Management Plan, and the Kern River Watershed Coalition Authority. The projects described in this application reflect consistency with the goals and objectives of many of the above mentioned initiatives. Other than internal planning efforts, this project is also consistent with the goals and objectives of many state and local planning efforts such as: the California Water Plan, SBX7-7, the California Groundwater Management Act, Association of California Water Agencies Groundwater Management Policy Principles, the California Water Action Plan, and the Ag Water Management Council.

In response to growing drought impacts, the District began evaluating water and energy conservation projects that would: a) reduce costs by reducing energy consumption and, b) utilize dry-year supplies more effectively. As part of that effort, the District worked through its newly hired District Engineer, consulting Engineering firms, and the Irrigation Training Research Center to identify and provide preliminary designs of the projects contained herein.

The Stockdale East Groundwater Recharge Project and Central Intake Pumping Plant - Phase 2 have many aspects and details that required early planning, preliminary designs and practical project development. The District has spent significant time and resources evaluating the feasibility of the projects. The evaluation included consideration of issues such as water system delivery effectiveness, construction reasonableness, environmental impacts and cost benefits. In order to further evaluate the project effectiveness and impacts the District continued its efforts to develop these project components and took steps necessary to prepare for project implementation. Below is a list of summary products performed or efforts put forth to support project development:

District Engineer, Technical Memo – Appendix D
Benefits - Stockdale East Recharge Basins

District Engineer, Technical Memo – Appendix E
Benefits - Central Intake Pumping Plant – Phase 2

Engineer Consultant – Zeiders Consultants, Technical Memo – Appendix F
Preliminary Basis of Design and Cost Estimate

District Engineer, Technical Memo – Appendix G
On-Farm Water Use Efficiency Project

Readiness to Proceed - ***Subcriterion No. F.2***

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

Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work performed specifically in support of the proposed project.

With funding assistance from the Bureau of Reclamation in connection with a 2016 WaterSMART Grant, the District will proceed with implementing the proposed project according to the estimated schedule. Please see Appendix C for a proposed Project Schedule.

In general, it is the intention of the District to satisfy all CEQA and NEPA compliance requirements prior to any project groundbreaking activities of project components proposed under the project. An Environmental Impact Report (EIR) for the components included in this grant application and other related components was developed and circulated for public review, and was certified December 8, 2015. Continued project planning, designs and procurement will be performed concurrently with the CEQA and NEPA process when best suited for planning efficiency. Wherever possible, and as the schedule will allow, project component tasks are staggered to make the best use of time but as with all large projects efficient planning is required and therefore parallel efforts and overlap are unavoidable. Once the project is CEQA and NEPA compliant, the construction activities for components to include ground disturbing activities will begin. Additionally, project activity will have to be coordinated with normal District operations.

The District has contacted the local NRCS office as part of the application process to this grant. We have reviewed AWEP and EQIP programs and expect the on-farm aspects of this project to fully compliment NRCS efforts. If the grant is awarded to the District we will continue the cooperative effort to establish joint goals and objectives that both the NRCS and the District would support as part of this project.

It is estimated that the design and procurement will begin in October 2015, construction and/or ground disturbing activities will begin June 2016 when environmental analysis is complete and that all projects components will be completed by December 31, 2016. Please see Appendix C for schedule.

Performance Measures - ***Subcriterion No. F.3***

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

While it is extremely difficult to quantify the project's overall improvements to conservation and efficiency, we do know that the project components are proven, practical, and effective methods of doing so. That being said, given institutional operational experience, conservative estimates, and the magnitude of the project, we anticipate project improvements to yield approximately: 8,700 AFY of saved water through increased groundwater recharge by means of newly constructed recharge ponds and a new conveyance route to utilize existing spreading grounds, plus 6,870 AFY of better managed water by improved system operation and newly installed high efficiency VFD/SCADA equipped pumps. Likewise, the Project proposes to save 344,000 kWh each year by means of improved system efficiencies by implementing VFD/SCADA technology and reducing total pump lift via a more direct delivery via the Central Intake Facility versus the Cross Valley Canal

After completion of the project, performance measures will be employed to help quantify actual project benefits:

Increased Groundwater Storage
Project components that improve groundwater recharge will determine performance measures by directly comparing pre-project recharge operations with improved recharge operations with added pond area and conveyance capacity.

Better Management
Project components that improve overall water management that decrease energy consumption will determine performance measures by estimating pre-project energy and conveyance costs with actual post-project costs.

VFD Reduced Energy Usage
Project components that reduced energy usage will determine performance measures by comparing existing pre-project and post-project efficiency values for the wells via multiple follow-up pump tests on the wells in varying conditions and by documenting revised operations of the Mack Pumps with actual flow demands versus pre-project fixed flow conditions and comparing systems spills.

Benefit Endangered Species and/or Critical Habitat
Project components that increase groundwater recharge could result added temporary habitat for T&E specie status in the area. Each recharge event, duration and extent will be numerically and documented.

Benefit to Water Markets
Project components that increase groundwater recharge could result in an increased water market will compare pre-project water market activity to post-project water market activity.

Irrigation Efficiency Improvement
Project components that improve irrigation efficiency associated with a potential NRCS project will determine performance measures by completing irrigation evaluations as performed by the local Mobile Irrigation Lab (operated by the Northwest Kern Conservation District).

Reasonableness of Costs - ***Subcriterion No. F.4***

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s).

For all projects involving physical improvements, specify the expected life of the improvement in number of years and provide support for the expectation (e.g., manufacturer's guarantee, industry accepted life-expectancy, description of corrosion mitigation for ferrous pipe and fittings, etc.). Failure to provide this information may result in a reduced score for this section.

As described later in Section 6.0, the estimated total project cost is $4,094,125 and is expected to have a life expectancy of 30 years. Life expectancy is based on project design criteria. The project will conserve 8,700 AF and better manage 6,870 AF per year. Using the suggested formula to calculate the "reasonableness of the cost for the benefits gained" this project generates a value of $8.76/AF.

$$\frac{\text{Total Project Cost}}{\text{Acre-Feet Conserved or Better Managed x Improvement Life}}$$

$$\frac{\$4,094,125}{15,570 \text{ AFY x } 30 \text{ years}}$$

= $8.76/AF

1.4.7 Additional Non-Federal Funding – *Evaluation Criterion G*

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

$$\frac{\$3,094,125}{\$4,094,125}$$

= 76% Non-Federal Funding

1.4.8 Connection to Reclamation Project Activities – *Evaluation Criterion H*

(1) How the proposed project is connected to Reclamation project activities?

Increases in District operational efficiencies will indirectly and directly benefit multiple Federal project districts by increasing the District's recharge abilities and resultant dry-year supplies that it can return to them via banking and exchange projects and reducing groundwater recovery costs that they pay as part of those projects.

(2) Does the applicant receive Reclamation project water?

Yes, the District receives CVP water through the Friant-Kern Canal.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

No, these are District-owned lands and facilities.

(4) Is the project in the same basin as a Reclamation project or activity?

Yes, the District shares the same Kern groundwater basin with many Federal contract Districts.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

Yes, the project is located within the Friant-Kern service area.

2. Environmental Compliance

The Stockdale East Groundwater Recharge Project is comprised of three project components that are located at one site. In general, all potential project sites and associated project activity will be located or conducted on existing facilities, right-of-ways, and lands that are routinely used, operated, and maintained.

The Stockdale East Recharge Ponds and equipping the Central Intake Pumping Plant - Phase 2 would all occur on existing RRBWSD right-of-ways, lands, and facilities. RRBWSD maintains and operates these facilities on a regular basis to provide a functioning water delivery system to deliver water to water users and its recharge and recovery facilities. Maintenance and operation activities include, but are not limited to, grading canal roads and canal banks, repairing or replacing head gates, silt and vegetation maintenance, pump removal and repairs, ditch tending, vehicle and personnel traffic.

The On-Farm Irrigation Efficiency component would be similar to the environmental conditions described for the above project components, but would normally take place on private landowner property. Typical farming operations include, but are not limited to, tilling, disking, grading, pests and weed control, planting, harvesting, farm equipment and personnel travel.

RRBWSD has certified an Environmental Impact Report according to the regulations and guidelines of the California Environmental Quality Act (CEQA) and will proceed as required for CEQA compliance. Additionally, National Environmental Policy Act (NEPA) compliance will be required if Federal funds are applied to the project. RRBWSD will assist and support the Bureau of Reclamation in the NEPA compliance process as necessary.

2.1 Impacts to Surrounding Environment

The majority of proposed project components will require earth-disturbing activities. When considering the potential surface area to be disturbed, the Recharge Pond Levee construction would be the single project component that would disturb the most surface area. This would require clearing and grubbing of approximately 229 acres of area that is currently heavily disturbed with on-going intensive farming and oil activities. Other components of this project would require minimal excavation to construct structures and retrofit facilities which would typically range from 3 to 8 feet deep between 25 to 75 linear feet. Other examples of minimal disturbances would include installing small concrete pads for VFD's and control panels and the digging of trenches for electrical conduit lines.

RRBWSD, as well as local contractors, have extensive experience with excavating activities and utilize best management practices concerning dust and erosion control. RRBWSD or the contractor would access a water truck or portable pumps for necessary dust suppression. Dust impacts to the environment will be minimal but will be evaluated according to CEQA and NEPA requirements.

All earth disturbing activities will be done absent of local irrigation or drain water in the canals or drains. Disturbed earth will have no contact with flowing water and therefore will have no impact to irrigation supply water or drain water. Project activities would not occur on natural stream or river channels. There will be no impacts to water but the potential impacts will be evaluated according to CEQA and NEPA requirements.

All project activities will occur on routinely disturbed ground and therefore will have minimal or no impact to animal habitat. The presence of working facilities along with routine RRBWSD and farmer activities make it unlikely for animals to use project sites as habitat. Potential impacts to animal habitat will be evaluated according to CEQA and NEPA requirements. Any necessary biological or cultural surveys will be conducted by qualified personnel as required for CEQA and NEPA compliance.

2.2 Endangered or Threatened Species

Although all project activities are going to be conducted on land that is routinely disturbed by irrigation and farming operations, Kern County is known to have habitat that can support endangered and threaten species. Listed below are several species listed as a Federal endangered species near the project sites. This list below is only intended to provide a list of potential endangered or threaten species in the general region of RRBWSD. By the limited nature of the construction, the District does not expect to have any impact on any of these species or corresponding suitable habitat within the project sites.

1. Tipton Kangaroo Rat
2. Blunt-nosed Leopard Lizard
3. San Joaquin Kit Fox

Potential impacts to Endangered or Threatened Species will be evaluated according to CEQA and NEPA requirements. As part of the environmental work, the District will retain a certified biologist to conduct a biological reconnaissance survey and prepare a report to evaluate potential impacts to biological resources within the project sites. If potential impacts are identified, the District will follow recommendations by the biologist to reduce those impacts to a less than significant level.

2.3 Wetlands

According to the U.S. Fish and Wildlife Service National Wetlands Inventory, there are no wetlands within project boundaries. There are however wetlands indicated in the

nearby vicinity of some of these project sites but are not expected to be negatively impacted by this project due to the limited nature of the ground disturbance.

2.4 Water Delivery System

RRBWSD operates a surface water delivery system with more than 25 miles of earthen canals. The water delivery system was developed in the 1970's. Many of the canal alignments have been realigned or modified over that time. Also, almost all of the check and gate structures have been replaced or updated over the same period in order to maintain a working water delivery system.

2.5 Modification to System Features

The Pumping Plant Phase 2 will be the equipping of an existing reinforced concrete pump station with pumps, motors, and pipe discharges. These facilities will be constructed during 2015. There will be a temporary impact to the normal operations of the facilities.

2.6 National Register of Historic Places

There are no registered historical landmarks within the project boundaries. RRBWSD does not have any knowledge of any other items that are listed or may be eligible for listing under the National Register of Historic Places. If Reclamation deems necessary, the District will retain a private cultural resources management consultant or arrange for Reclamation staff to again carry out a consultation to evaluate if any buildings or structures are eligible under the National Register of Historic Places. The expectation is that none will be identified inasmuch as the project improvements will be constructed in actively disturbed agricultural lands.

2.7 Archeological Sites

RRBWSD does not have any knowledge of known archeological sites within or in the vicinity of the proposed project sites. There has been over a century of ongoing farming operations and it is very unlikely that archaeological sites would be currently located or discovered within district boundaries. If Reclamation deems necessary, the District will work with Reclamation cultural resources staff to obtain clearance for archaeological sites within the project area. The District will retain a private cultural resources management consultant or arrange for Reclamation staff to carry out a consultation to conduct a Phase I intensive pedestrian cultural resource survey, and a cultural resources records search and Native American consultation to evaluate any impacts to cultural sites. Impacts to cultural resources are not expected. Nevertheless, the District is prepared to implement any necessary mitigation measures should cultural resources be identified for any component of the Project.

2.8 Other Environmental Concerns

Other environmental and cultural concerns that were noted regarding the Project area are:

a. Construction of the Project will support the important agricultural-based economy in the Southern San Joaquin Valley and should have only positive impacts on low income or minority persons living in the region.
b. The Project will not limit access to or ceremonial use of Native American sacred sites or tribal lands.
c. The Project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native species in the region.

3. Required Permits or Approvals

Due to the nature and location of selected project sites, we expect that no third party approval or permits will be required from local, state, or federal agencies in order to break ground for the Project.

4. Official Resolution

The Rosedale-Rio Bravo Water Storage District Board of Directors approved Resolution No. 473 on January 12th, 2016.

RESOLUTION NO. 473

RESOLUTION OF THE BOARD OF DIRECTORS OF THE ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT WATER SMART GRANT APPLICATION

WHERAS, Rosedale-Rio Bravo Water Storage District has prepared an application to apply for federal funding from the United States Department of the Interior, Bureau of Reclamation (Reclamation) to assist in the funding of the Water and Energy Efficiency Project; and

WHERAS, the funding opportunity provided by Reclamation through their Grant Program entitled "2016 WaterSMART: Water and Energy Efficiency Grants for FY 2016" Funding Opportunity Announcement No. is #R16-FOA-DO-004; and

WHERAS, the Stockdale East Groundwater Recharge Project involves the construction of approximately 200 acres of recharge ponds and the equipping of the Central Intake Pumping Plant with approximately 140 cfs of pumping capacity to improve overall system efficiency by increasing groundwater recharge and improved conveyance of water; and

THEREFORE, BE IT RESOLVED, the Rosedale-Rio Bravo Water Storage District Board of Directors have reviewed the application and support its submittal for Reclamation assisted funding. The Board of Directors approve Dan Bartel, Assistant General Manager-Engineer, as the official with legal authority to enter into a cooperative agreement with Reclamation and confirm that Rosedale-Rio Bravo Water Storage District is capable of providing the amount of funding specified in the application. Rosedale-Rio Bravo Water Storage District will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

PASSED APPROVED AND ADOPTED on this 12th day of January 2016 by the following roll-call vote:

AYES: Directors Parmeter, Selvidge, Enns & Unruh
NOES: none
ABSENT: Director Mittwer
ABSTAINED: None.

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

President/Board of Directors

ATTEST:

Secretary/Board of Directors

Appendix A – 2013 Crop Survey Data

RRBWSD Crop Survey 2013
From KC Permit Data as of August 27, 2013

Crop	Gross Acreage (1) (Acres)	Net Irrigated Acreage (2) (Acres)	Applied Water Requirements (3) Per Acre (AF/Ac.)	Applied Water Requirements (3) Total (AF)	Percent of Total Water Applied	Consumptive Use Requirements (7) Per Acre (AF/Ac.)	Consumptive Use Requirements (7) Total (AF)	Percent of Total Consumptive Use
Cotton	1,920	1,824	3.6	6,566	5.33	2.7	4,925	5.52
Alfalfa	6,158	5,850	5.1	29,641	24.05	3.8	22,230	24.91
Almonds	11,958	11,360	4.1	46,955	38.09	3.1	35,216	39.46
Pistachios	1,948	1,851	4.0	7,402	6.01	3.0	5,552	6.22
Misc. Trees (4)	36	34	4.0	137	0.11	3.0	103	0.11
Grapes	421	400	3.1	1,227	0.99	2.3	920	1.03
Corn (Field & Sweet)	932	885	3.2	2,833	2.30	2.4	2,125	2.38
Potatoes	1,081	1,027	3.7	3,834	3.11	2.8	2,875	3.22
Wheat & Grains	2,518	2,392	1.9	4,466	3.62	1.4	3,349	3.75
Vegetable Crops (5)	1,381	1,312	2.7	3,499	2.84	2.0	2,624	2.94
Pasture & Grass	214	203	5.2	1,057	0.86	3.9	793	0.89
SUBTOTAL	28,567	27,139	4.0	107,616	87.38	3.0	80,712	90.43
Industrial & Residential (6)	7,490	7,116	2.2	15,654	12.70	1.2	8,539	9.57
Fallow & Undeveloped Lands	5,588	5,309				0.4	2,123	
TOTAL	41,645	39,563	3.1	123,270		2.3	91,374	

NOTES:
(1) Gross Acreage represents net assessable acres per the Assessment Roll. Includes irrigated acreage within District owned property in Section 1, 30/25.
(2) Net Irrigated Acreage is assumed to be 95 percent of the Gross Acreage.
(3) Irrigation efficiency assumed to be 75%.
(4) Includes fruit and eucalyptus trees.
(5) Vegetable crops include carrots, beans, sugar beets, tomatoes, onions, broccoli, peppers and garlic.
(6) Includes commercial, industrial, feedlots, dairies, hydroponic vegetable, oil facilities, residential and schools.
(7) Consumptive Use values based on ITRC methodology & average rainfall of 5.86 in/yr

Canals & Recharge Basins =	1,258 Ac
Total Net Assessable Area =	42,903 Ac
Total Gross Area of District =	44,380 Ac
Estimated Cons Use of Precip =	13,848 Ac-ft
Cons Use - Cons Use of Precip =	77,526 Ac-Ft

Appendix B – Project Summary Matrix

ROSEDALE -RIO BRAVO WATER STORAGE DISTRICT
WATER CONSERVATION, ENERGY EFFICIENCY, AND SOLAR POWER PROJECT
PROJECT EVALUATION MATRIX

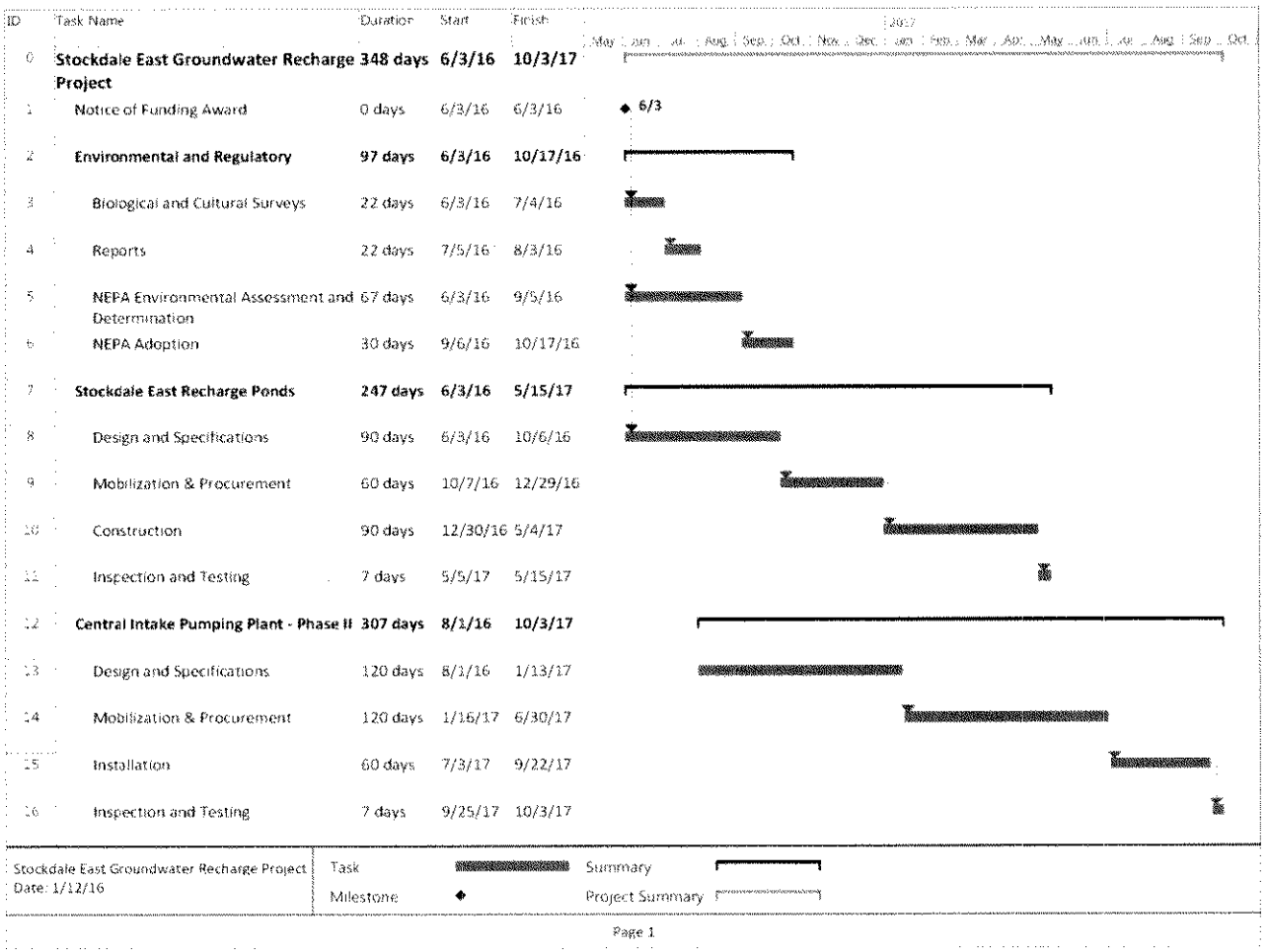
Component	Financial							Source of Supply							Adjoining Entities Issues							Legal					Environmental Factors						
								1	1	1	1	1	1	6	1	1	1	1	1	1	6	2	1	2	5	10	1	2	2	1	1	1	8
	Capital Cost	Annual Capital Cost	Increased Annual O&M Cost	Total Annual Cost	Annual Water Savings (AF)	Total Annual Benefit ($)	Benefit/Cost Ratio [3]	Kern River (Surface)	SWP (Surface)	Federal	Tailwater	Kern River (GW)	SWP (GW)	Score (out of 100)	BVWSD	KCWA	KVBA	WWMD	STWSD	PRIVATE	Score (out of 100)	Water Rights	MOU	Contract Negotiation	Litigation	Score (out of 100)	Water Quality	Water Levels	ESA - Species	ESA - Habitat	Wetlands	Economic Impacts	Score (out of 100)
Stockdale East Recharge Ponds	$ 1,706,000	$135,562	$ 85,300	$220,862	1700	$ 710,500	3.38	5	5	5				25	1	1	1	1	1	3	13	5		5		10	3	3	1	1	1		11
Central Intake Pumping Plant - Phase 2	$ 2,388,000	$175,757	$ 178,640	$354,397	10,700	$ 1,337,500	3.77	5	5	5				25	1	1	1	1	1	3	13	5		5		10	3	3	3	3	3		15
	$ 4,094,000																																

1. Scores represent level of effort required on a scale from 1 to 10, with 1 being easy and 10 being nearly impossible. Therefore, the lowest scores are the most likely to succeed and should receive the highest priority. Each category score is c
2. Scores shown for CEQA represent level of effort for project implemented alone, not in combination with other projects. Final CEQA effort will be aggregate. Each level is multiplied times a difficulty factor
3. If no other tangible benefit assumption water valued at $125/AF for B/C ratio

CEQA [2]					Permitting / Approval												Project Development						
2	8	7	10	25	1	1	1	1	1	1	1	1	1	1	1	12	1	1	1	1	1	5	
Categorical Exemption	Negative Declaration	Mitigated Neg. Dec.	Environmental Impact Report	Score (out of 100)	USACOE - 404	USFWS	CDFG - 1601	CDFG - Incidental Take	CRWQCB - 401 WQC	SWRCB - Water Rights	CDWR - SWP	CDWR - Dam Safety	KCWA	KC Supervisors	CalTrans	Kern County Road Dept.	Score (out of 100)	Land Acquisition	Sitework/Design	Conveyance Facilities	Recharge Facilities	Recovery Facilities	Score (out of 100)	Overall Score – Complexity (Out of 1000)
			5	50												0		2	2	5		18	
			5	50												0		2	2	5		18	

Appendix C – Preliminary Project Schedule

ID	Task Name	Duration	Start	Finish
0	**Stockdale East Groundwater Recharge Project**	**348 days**	**6/3/16**	**10/3/17**
1	Notice of Funding Award	0 days	6/3/16	6/3/16
2	**Environmental and Regulatory**	**97 days**	**6/3/16**	**10/17/16**
3	Biological and Cultural Surveys	22 days	6/3/16	7/4/16
4	Reports	22 days	7/5/16	8/3/16
5	NEPA Environmental Assessment and Determination	67 days	6/3/16	9/5/16
6	NEPA Adoption	30 days	9/6/16	10/17/16
7	**Stockdale East Recharge Ponds**	**247 days**	**6/3/16**	**5/15/17**
8	Design and Specifications	90 days	6/3/16	10/6/16
9	Mobilization & Procurement	60 days	10/7/16	12/29/16
10	Construction	90 days	12/30/16	5/4/17
11	Inspection and Testing	7 days	5/5/17	5/15/17
12	**Central Intake Pumping Plant - Phase II**	**307 days**	**8/1/16**	**10/3/17**
13	Design and Specifications	120 days	8/1/16	1/13/17
14	Mobilization & Procurement	120 days	1/16/17	6/30/17
15	Installation	60 days	7/3/17	9/22/17
16	Inspection and Testing	7 days	9/25/17	10/3/17



Appendix D – Stockdale East Recharge Ponds Technical Information

TO: File

FROM: Dan W. Bartel (CE 56433)

DATE: November 5, 2014

RE: Tech Memo – Stockdale East Recharge Ponds

The District currently operates five different direct recharge pond areas in order to support local groundwater pumping. To help augment these operations RRBWSD proposes to construct approximately 200 acres of recharge ponds near the intersection of Highway 43 and Stockdale Highway. This area has long been known to have excellent groundwater recharge characteristics and is conveniently located to the Cross Valley Canal which could provide local, state, and federal water to and from the property. **Long term recharge rates are expected to be 0.28 AF/Acre/Day thus this property would be able to deliver up to 19,000 AF into the basin during each wet year**. Hydrology shows that the region experiences wet years sufficient to provide supplies to the project about every three in ten years. That would result in an average of additional 5700 AF stored groundwater. Approximately 50 cfs of the Central Intake Pumping Plant – Phase 2 would be dedicated to serving this site.

Appendix E – Central Intake Pumping Plant 2 Technical Information

TO: File

FROM: Dan W. Bartel (CE 56433)

DATE: November 5, 2014

RE: Tech Memo – Central Intake Pumping Plant – Phase 2

In order to deliver water to the Stockdale East Recharge Ponds 50 cfs of the proposed 140 cfs of pumping plant capacity would be committed. An additional 90 cfs would be included to offer capacity to deliver state and federal water to recharge areas located approximately 1.5 miles north of the site (Superior Basins). This would give added access to recharge supplies and potentially add up to 10,000 AF into the groundwater basin during each wet year. Hydrology shows that the region experiences wet years sufficient to provide supplies to the project about every three in ten years. **That would result in an average of 3,000 AFY of additional stored groundwater.**

The 140 cfs pumping plant is to be fitted with VFD's and SCADA systems thus not requiring the traditional manual pump bypass system which would otherwise require typical spill back operations of about 10% (**870 AFY**). The pumping plant is expected to have a TDH of 15 feet under normal operating conditions. For these types of pumps, it takes close to 1.33 kWh/AF to boost 1 inch of TDH. This is an annual energy savings of 18,000 kWh per year for avoided spillage. There is at times the opportunity to convey water up three pumping plants in the Cross Valley Canal and then back to the Superior Basins. This requires an additional 45 feet of elevation lift. It is estimated that the new pumping plant will average **6,000 AFY of better managed water from** operations avoiding the 40 feet of additional lift via the other system. This is an annual energy savings of 326,000 kWh per year for avoided additional lift. **The sum total energy savings will be 344,000 kWh per year which equates to and energy cost savings of approximately $52,000**.

Appendix F – Preliminary Design Criteria Information

ZEIDERS CONSULTING
1655 Greeley Road, Bakersfield, CA 93314
Phone (661) 589-8366, Fax (661) 589-8902, Email wzeiders@zeidersconsulting.com

BASIS OF DESIGN MEMORANDUM

November 10, 2014

To: Dan Bartel – Rosedale Rio Bravo Water Storage District

From: William Zeiders - Zeiders Consulting

Subject: Design Criteria for the "RRBWSD – Stockdale East Recharge and Phase 2 Pumping plant.

INTRODUCTION AND BACKGROUND

This Basis of Design Memorandum provides a summary of the design criteria used to size and design (at the 30-percent level) the Stockdale East Recharge Facility and the related Phase 2 Pumping Plant.

The Stockdale East Property is located south of Stockdale Highway, east of Enos Lane, north of the Cross-Valley Canal and Pioneer Canal within Section 1, T30S, R25E and consists of a gross acreage of approximately 237 Acres with a net whetted acreage of 201 acres and pond bottom acreage of 196 acres.

The Recharge facility would consist of:

- Recharge basins that could be flooded when recharge water is available from either the Kern River or Cross Valley Canal. Certain portions of the property will continue to have the ability to be farmed during periods when recharge water is not available for recharging to occur.
- Pump Station - a low head-high volume booster pump station that would provide necessary head to divert the water from a forebay supplied with recharge water from either the Cross Valley Canal or the Goose Lake Slough via the Central Intake Pipeline.
- Pond to pond back-up/diversion structures that would control the inflow, outflow and water levels of the recharge ponds.

This Facility as envisioned would facilitate:

- Provide California Aqueduct recharge water from the Cross Valley Canal to the Stockdale East ponds.
- Provide Kern River recharge water from the Goose Lake Slough to the Stockdale East ponds.

DESIGN CRITERIA

The following criteria (provided by RRBWSD), was used to determine the design flows in sizing and preliminary design of the Facility, based on the project's Recharge Demand as discussed

ZEIDERS CONSULTING
1655 Greeley Road, Bakersfield, CA 93314
Phone (661) 589-8366, Fax (661) 589-8902, Email wzeiders@zeidersconsulting.com

below.

Recharge Demand: The Recharge Demand for the project is estimated to be 183 cfs, split between the recharge ponds as follows:

Stockdale East = 51 cfs
Superior West and East= 132 cfs
Total Recharge Demand (for Pumpstation) = 183 cfs

The total recharge capacity by recharge area was calculated by applying the long-term infiltration rate to the net pond acreage. Below is a summary of the calculated recharge capacity by recharge area.

Recharge Capacity – Stockdale East:
Recharge Acreage = 195 Acres (see preliminary pond layout attached)
Estimated long infiltration rate = 0.35 (provided by RRBWSD based upon their past experience) Fill rate = 0.35 AF/acre/day x 1.5 x 195 Acres = 102 AF/day = 51cfs.

Recharge Capacity – Superior West & Superior East:
Recharge Acreage = 465 Acres + 136 Acres = 601 Acres
Long term infiltration rate = 0.44 AF/acre/day (provided by RRBWSD based upon historical recharge records - attached)
Fill rate = 0.44 AF/acre/day x 1.5 x 601 Acres = 397 AF/day = 198 cfs.
Long term average = 0.44 AF/acre/day x 601 Acres = 264 AF/day = 132 cfs.

- Northward (Recharge) - 51 cfs to diversion to Stockdale East ponds via low head/high volume pumps & then 132 cfs via low head/high volume pumps lifting the water to the Central Intake line northward from there to Goose Lake Slough.
- Southward (Recharge) – 51 cfs southward to pumps at Stockdale East spreading ponds to be lifted into recharge pond facilities.

Pumping Plant Capacity: The Pumping Plant capacity is equivalent to the Recharge Capacity which is a total of 51cfs for the Stockdale East Ponds and 132cfs for the Superior East and West Ponds.

- The range of anticipated recharge diversion flowrates are anticipated to be a minimum of 10 cfs to a maximum of 183 cfs with the ability to fine tune the diversion flowrates to within 1 to 2 cfs within that range.

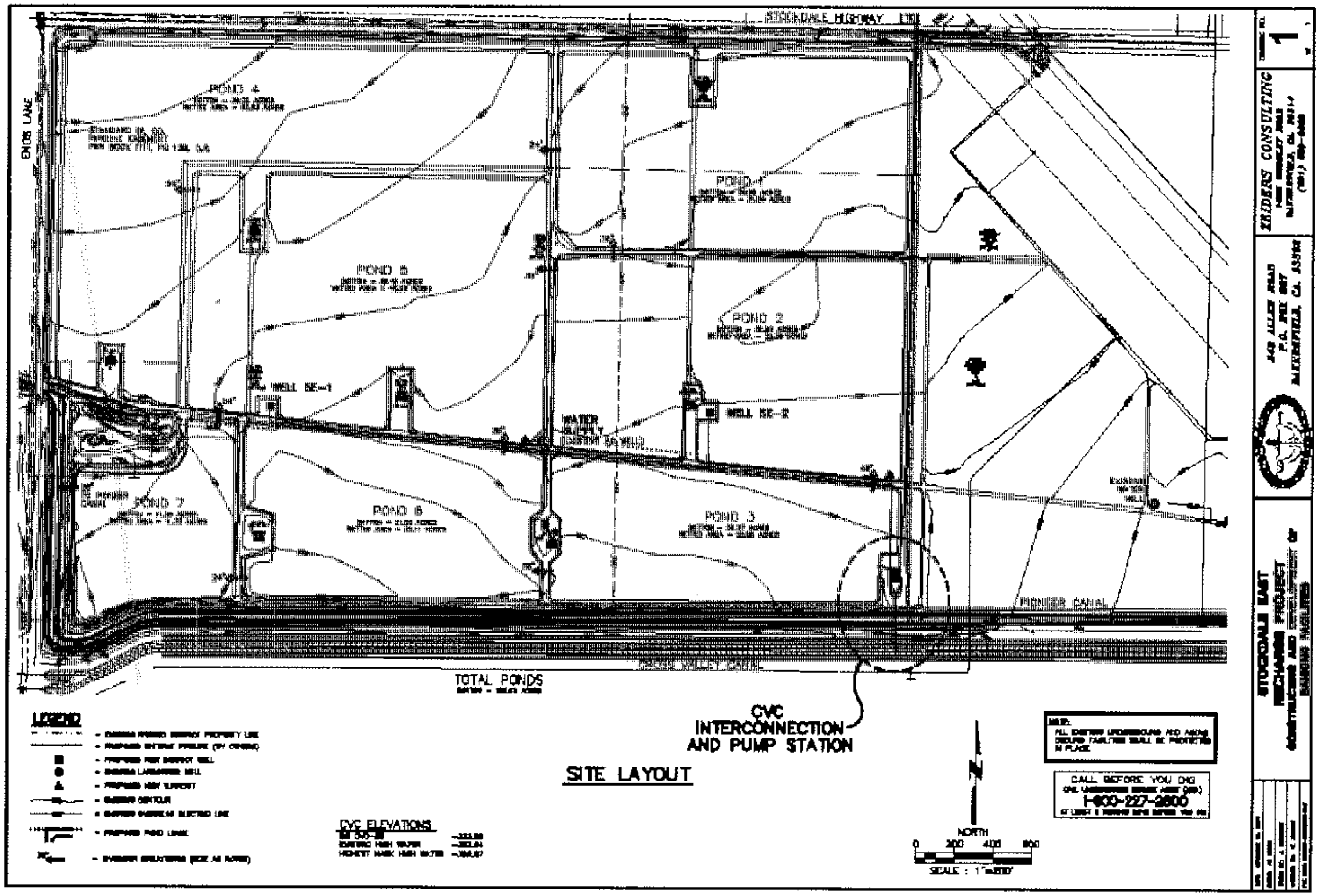
Pumping Plant Size/Design: The pumps in the pumping plant would be low head, high capacity open impeller vertical pumps powered by electric motors (low speed for the larger pumps) equipped with Variable Frequency Drives to allow for adjustment of the flowrates to match the demand.

- The following combination of five (5) pumps equipped with VFD motor control panels were determined to offer a desirable combination of pump sizes to meet the criteria:
  - 2 - 20 cfs pumps *
  - 2 – 40 cfs pumps *

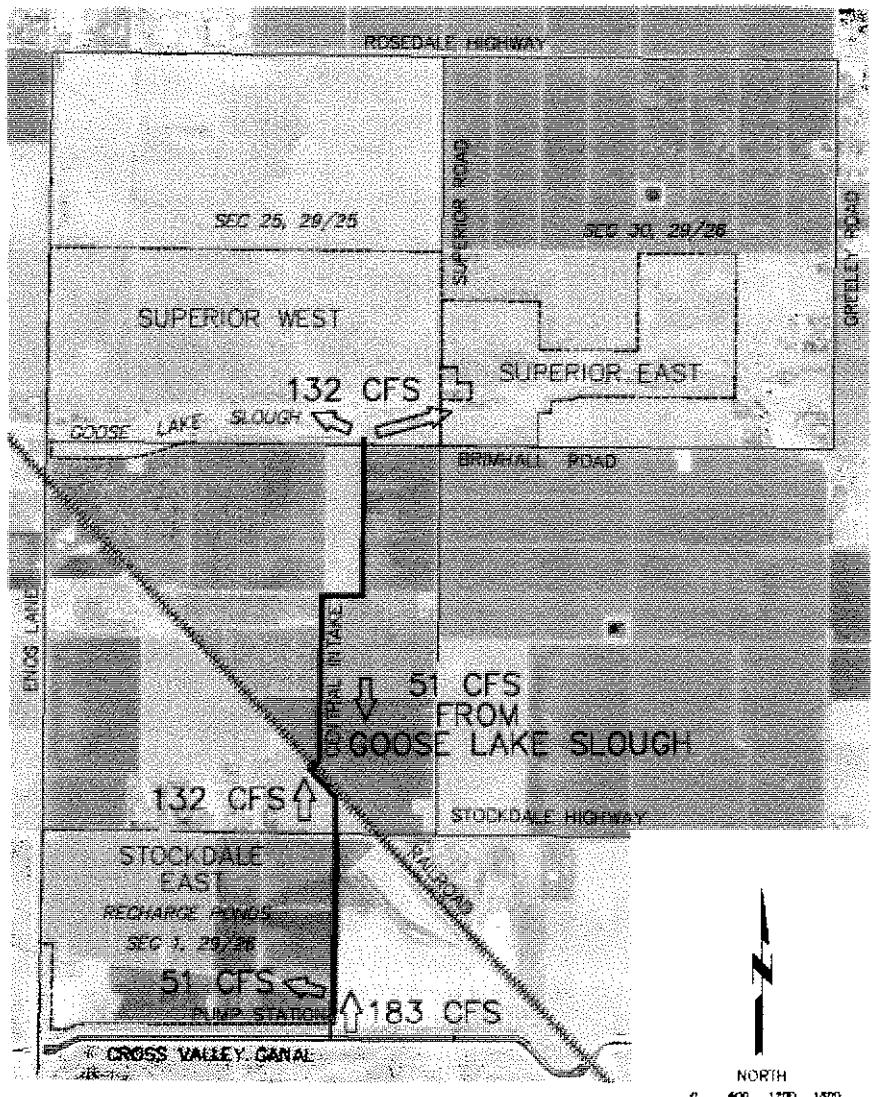
ZEIDERS CONSULTING
1655 Greeley Road, Bakersfield, CA 93314
Phone (661) 589-8366, Fax (661) 589-8902, Email wzeiders@zeidersconsulting.com

- 1 – 60 cfs pump *
- The manifold and discharge piping would be equipped with flow meters and appropriate valving to allow for separation of the diversions to Stockdale East Ponds and Superior Ponds or combined operation.
- The pumping lifts (total dynamic heads) are anticipated to be in the range of 15ft to 25ft with a total horsepower demand anticipated to be in the range of 400 to 600 horsepower.

Footnote:
* Flowrates are approximate, represent relative pump size and are subject to revision as design is refined.

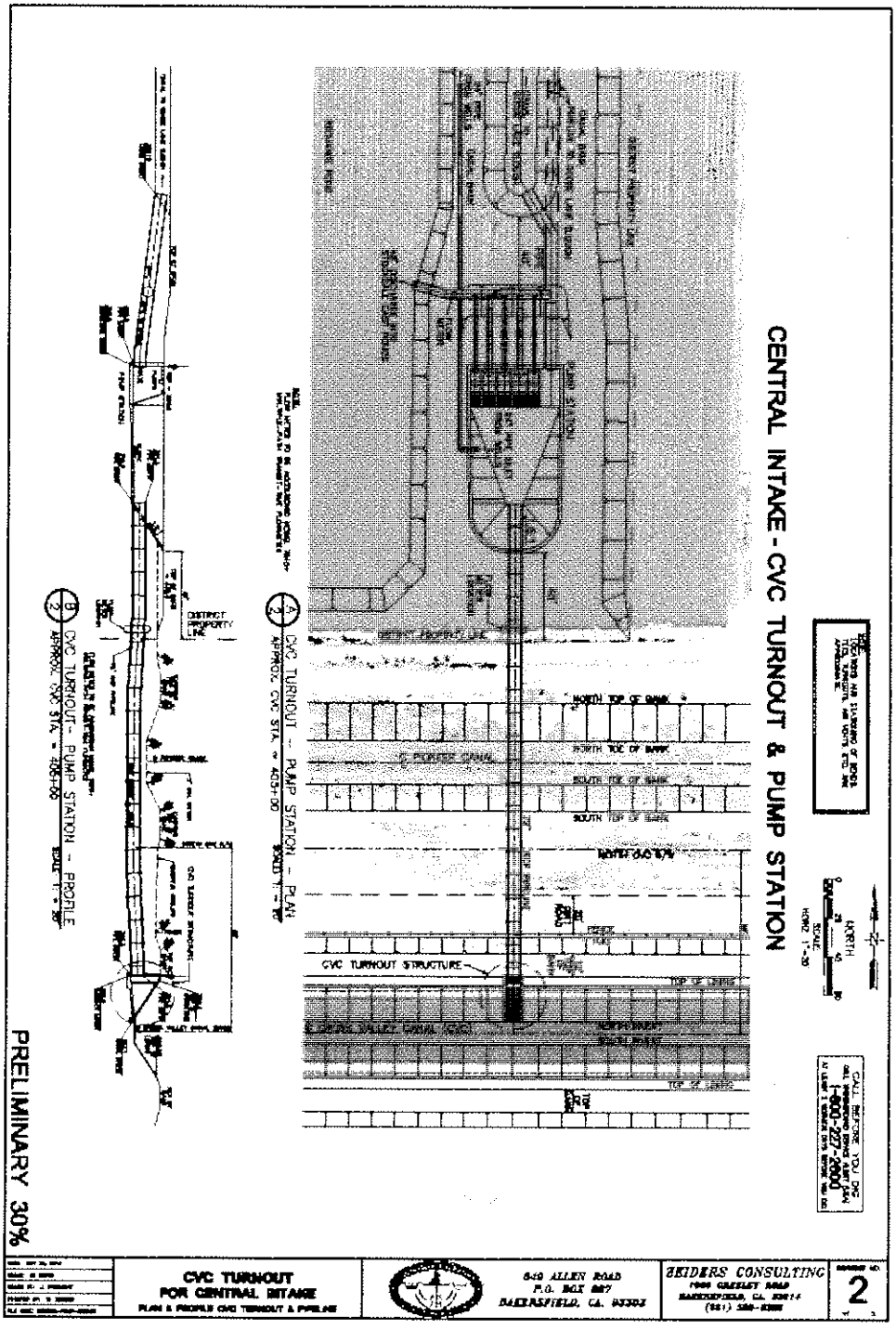

STOCKDALE HIGHWAY
ENOS LANE
POND 4
POND 1
POND 5
POND 2
WELL SE-1
WATER SUPPLY
WELL SE-2
POND 7
POND 6
POND 3
PIONEER CANAL
TOTAL PONDS
CVC INTERCONNECTION AND PUMP STATION
SITE LAYOUT
LEGEND
CVC ELEVATIONS
NORTH
0 200 400 800
SCALE : 1"=200'
CALL BEFORE YOU DIG
1-800-227-2600
KRIDERS CONSULTING
STOCKDALE EAST RECHARGE PROJECT
1

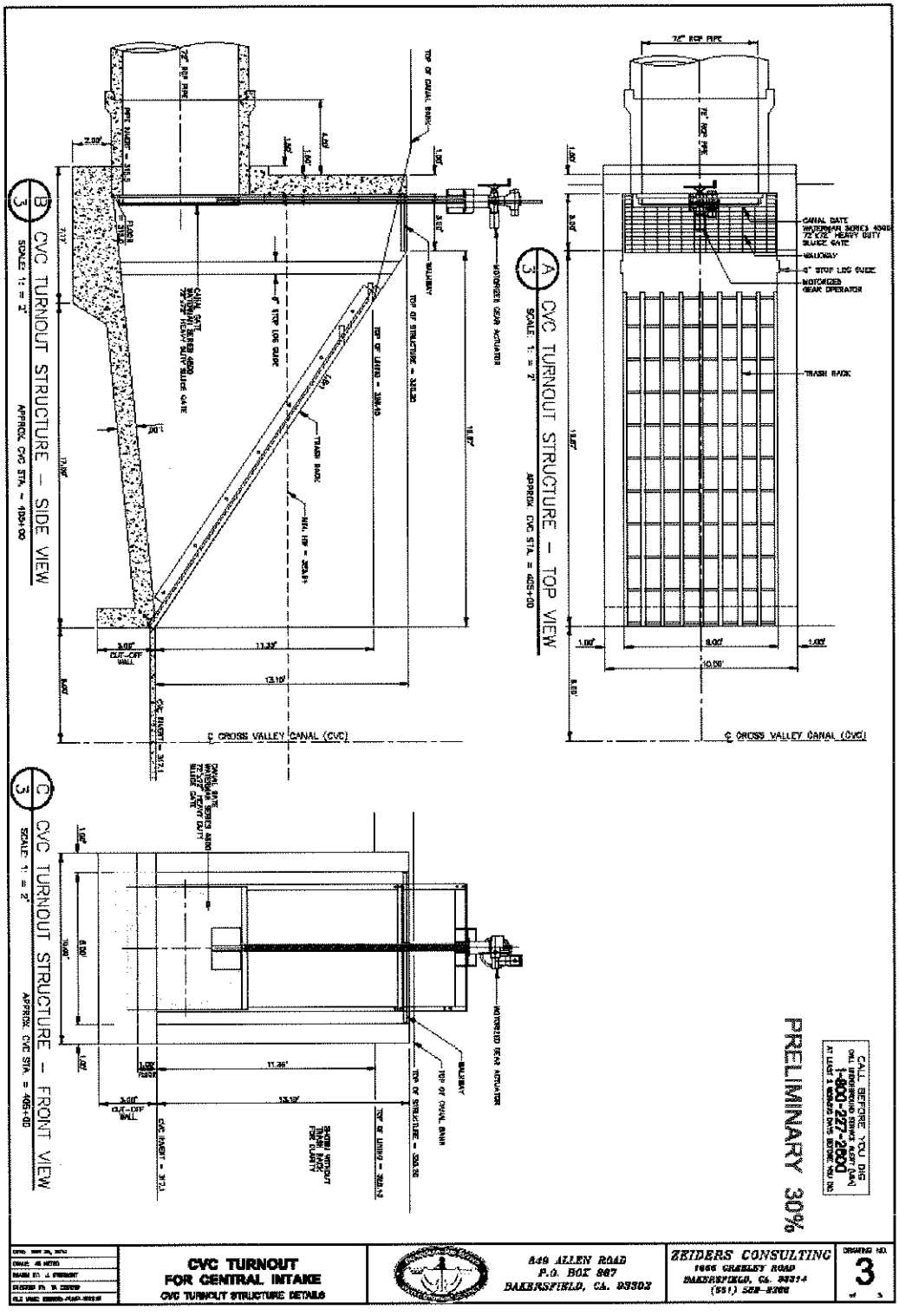
RECHARGE / PUMP STATION - DESIGN CRITERIA



PRELIMINARY

	RECHARGE / PUMP STATION DESIGN CRITERIA		849 ALLEN ROAD P.O. BOX 867 BAKERSFIELD, CA. 93302	ZEIDERS CONSULTING 1905 GREELEY ROAD BAKERSFIELD, CA. 93314 (661) 325-5388	1


CENTRAL INTAKE - CVC TURNOUT & PUMP STATION
PRELIMINARY 30%
CVC TURNOUT STRUCTURE
CVC TURNOUT - PUMP STATION - PROFILE
CVC TURNOUT - PUMP STATION - PLAN
CVC TURNOUT FOR CENTRAL INTAKE
PLAN & PROFILE CVC TURNOUT & PIPELINE
EKIDERS CONSULTING
2


B 3 CVC TURNOUT STRUCTURE – SIDE VIEW
SCALE: 1" = 2'
APPROX. CVC STA. = 1051+00
A 3 CVC TURNOUT STRUCTURE – TOP VIEW
SCALE: 1" = 2'
APPROX. CVC STA. = 405+00
C 3 CVC TURNOUT STRUCTURE – FRONT VIEW
SCALE: 1" = 2'
APPROX. CVC STA. = 405+00
℄ CROSS VALLEY CANAL (CVC)
CANAL GATE
TRASH RACK
MOTORIZED GEAR OPERATOR
PRELIMINARY 30%
CALL BEFORE YOU DIG
1-800-227-2600
CVC TURNOUT
FOR CENTRAL INTAKE
CVC TURNOUT STRUCTURE DETAILS
849 ALLEN ROAD
P.O. BOX 867
BAKERSFIELD, CA. 93302
ZEIDERS CONSULTING
DRAWING NO.
3

Appendix G – Technical Memorandum: On-Farm Water Use Efficiency Project

ROSEDALE – RIO BRAVO
WATER STORAGE DISTRICT
849 Allen Road * P.O. Box 20820 * Bakersfield, California 93390-0820 * (661) 589-6045 * (661) 589-1867

MEMORANDUM

To: Water Users

From: Dan Bartel (dbartel@rrbwsd.com)

Date: January 7 2016

Subject: On-Farm Water Use Efficiency Project

The District is preparing to apply for grant funds from the federal WaterSMART Grant Program to help fund various system modernization projects throughout the District, if awarded the Natural Resources Conservation Service (NRCS) could make additional monies available for on-farm irrigation system improvements. If the District is awarded and your project qualifies for funding you could receive a 50% cost-share towards projects geared at improving on-farm irrigation efficiencies. The District is very interested in programs aimed at improving water use efficiency. To improve our chances of award we would like to get an indication of your interest in new on-farm projects (not replacements) that you would participate in **if funding was available**. Below are various project options, please fill out and return this questionnaire to this office no later than January 15. Note that the projects listed below are not necessarily fundable programs. We apologize for the short turn-around time but the application period is very, very short.

Project	APN(s)	Acreage Served and/or Length	Approx Cost
☐ Tailwater Return System			
☐ Pipeline	104-292-10	45	12,000
☐ Ditch Liner			
☐ System Evaluation			

☐ SCADA and/or Metering			
☐ Solar Retrofits	104-292-10	45	
☐ Variable Frequency Drive	104-292-11	70	160000
	X		
☐ Micro-irrigation System	104-292-10	45	40,000
☐ Other			

Entity Name JOHNSON FARMS

Authorized Agent _____ MARK JOHNSON
(Signature) (Print)

ROSEDALE – RIO BRAVO
WATER STORAGE DISTRICT
849 Allen Road * P.O. Box 20820 * Bakersfield, California 93390-0820 * (661) 589-6045 * (661) 589-1867

MEMORANDUM

To: Water Users

From: Dan Bartel (dbartel@rrbwsd.com)

Date: January 7 2016

Subject: On-Farm Water Use Efficiency Project

The District is preparing to apply for grant funds from the federal WaterSMART Grant Program to help fund various system modernization projects throughout the District, if awarded the Natural Resources Conservation Service (NRCS) could make additional monies available for on-farm irrigation system improvements. If the District is awarded and your project qualifies for funding you could receive a 50% cost-share towards projects geared at improving on-farm irrigation efficiencies. The District is very interested in programs aimed at improving water use efficiency. To improve our chances of award we would like to get an indication of your interest in new on-farm projects (not replacements) that you would participate in **if funding was available**. Below are various project options, please fill out and return this questionnaire to this office no later than January 15. Note that the projects listed below are not necessarily fundable programs. We apologize for the short turn-around time but the application period is very, very short.

Project	APN(s)	Acreage Served and/or Length	Approx Cost
☐ Tailwater Return System			
☐ Pipeline			
☐ Ditch Liner			
☐ System Evaluation			

Stockdale East Groundwater Recharge Project
Rosedale-Rio Bravo Water Storage District
Kern County, California

☐ SCADA and/or Metering			
☐ Solar Retrofits			
☒ Variable Frequency Drive	104-280-18-00-2	236	$40,000
	(+ 104-291-06-00-7	5.66ac.)	
☐ Micro-Irrigation System			
☐ Other			

Entity Name RICHARD ENNS FARMS

Authorized Agent Richard Enns (Signature) RICHARD ENNS (Print)