WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Years 2020 and 2021

3 October 2019

Funding Opportunity Announcement No. BOR-DO-20-F001
CFDA No. 15.507

FIREBAUGH CANAL WATER DISTRICT 2ND LIFT CANAL LINING PROJECT

Headworks to Ashlan Avenue

Submitted By:
Firebaugh Canal Water District
Jeff Bryant, Manager
2412 Dos Palos Road, PO Box 97
Mendota, CA 93640
Ph: (559) 655.4761
Fax: (559) 655.3658
Email: bryant_jeff@sbcglobal.net

Prepared by:
Summers Engineering, Inc
Consulting Engineers
Hanford California

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EXECUTIVE SUMMARY

Date: October 3, 2019
Applicant Name: Firebaugh Canal Water District (FCWD)
City, County, State: Mendota, Fresno, California

The Proposed Project will replace approximately 2.5 miles of Firebaugh Canal Water District's (FCWD or District) unlined 2nd Lift Canal with a concrete lined canal. The existing channel is a primary lift canal for the District with a capacity of approximately 100 cubic feet per second (cfs). Seepage losses are estimated at 320 acre feet per year (afy), which contributes to the discharge of saline subsurface drain water to the San Joaquin River system. Additionally, the existing earthen canal promotes the growth of aquatic vegetation which inhibits the use of high-efficiency irrigation systems (surface drip, subsurface drip and microsprinklers). The existing weir structure requires frequent field visits to adjust the water level controls as flow demands change. The concrete lined channel will encourage growers to utilize high-efficiency irrigation systems which will reduce tail water production and promote water conservation.

FCWD delivers 85,000 acre feet in a typical year although the recent drought reduced their water supplies to 60,000 acre feet in Water Year 2014. The proposed project will improve management on 15,600 acre feet of deliveries per year and eliminate an estimated 320 acre feet per year in seepage losses. Additionally, the improved system could encourage growers operating 800 acres within the 2nd Lift Canal service area to convert to high efficiency irrigation system, which could potentially conserve another 1120 acre feet per year through improved irrigation system efficiencies. These growers have indicated interest in participating in NRCS funding assistance programs for irrigation upgrades.

The proposed project could begin construction as early as October 2020 and all construction would be completed before September 2021. The proposed project is not located on a Federal facility.

Table 1 shows the proposed project cost and funding breakdown.

Table 1: Funding Chart

Funding Source	Funding Amount
Firebaugh Canal Water District (non-federal)	$1,303,300
Requested Reclamation Funding	$1,000,000
Total Project Funding	$2,303,300

BACKGROUND DATA

FCWD is not a Reclamation District but receives its water supply through the Central Valley Project (CVP) via the Delta-Mendota Canal by way of an exchange contract. The water use within the District boundaries is entirely for agricultural irrigation and is obtained through an exchange contract with the U.S. Bureau of Reclamation via the Delta-Mendota Canal. The primary crops are almonds, melons, tomatoes, cotton, alfalfa, wheat, barley, pomegranates, pistachios, onions and asparagus.

There are approximately 35 water users using an average annual water supply to FCWD is 85,000 acre feet in a non-critical water year and 58,000 acre feet in a critical (drought) water year. Approximately 70% of the crops are grown with high efficiency irrigation systems including surface drip, subsurface drip, and micro-sprinklers. The remaining farmed acreage is irrigated with conventional methods such as furrow and hand-move sprinklers. There are 22,000 acres developed to irrigate crop land within the FCWD. The District typically delivers 100% of its allocation and does not anticipate a significant change in demand in the future. See **Figures 1** and **2**.

The District's irrigation supply is delivered from the Mendota Pool via the Delta-Mendota Canal into a series of Lift Canals (1st, 2nd, and 3rd), totaling approximately 40 miles of canals. This distribution system delivers water to the District's 37 miles of laterals, which in turn, make deliveries to the individual fields. Approximately 27 miles of canals and laterals have been lined since 2000. All lined canals have performed as expected and the District and its users have benefited.

A previous project includes energy efficiency in the form of solar-powered flow control system with the modernization of Check 1. Prior to that project, the existing Check 1 was manually operated, requiring District staff to drive to the site, manually adjust boards, and drive back to the office. The upgraded system now has automated flow control gates energized with solar power.

Studies in and around the District show loss factors, including seepage from canals and conveyance facilities, in the range of 10%. In recent years, FCWD has spent more than $8 million on infrastructure projects to line and pipe canal laterals and improve automation and controls. About 70% of the District's irrigated land has converted to drip or other high-efficiency irrigation systems, prompted largely by these improvements. The District participated in a regional water use study which estimated the typical on-farm efficiency to be between 80% and 90%. This study evaluated crop evapotranspiration requirements, leaching and drainage requirements, irrigation methods and actual water deliveries.

Firebaugh Canal Water District lies within the Grassland Drainage Area (GDA) and is a participating agency in the Grassland Bypass Project (GBP), through which subsurface drain water generated within the region is discharged to the San Joaquin River. Most of the GDA is underlain with a shallow saline aquifer which is high in dissolved solids (salts), boron, and selenium, all of which are considered constituents of concern by the Central Valley Regional Water Quality Control Board. This shallow water table is managed through on-farm subsurface (tile) drainage systems and regional deep drains that

intercept deep percolation from irrigation and seepage from unlined canal systems. Currently this drain water is discharged to the San Joaquin River through the Grassland Bypass Project in accordance with a waste discharge permit. Each acre foot of this drainage contains an average of 0.25 lbs of selenium, 18 lbs of boron, and 3.3 tons of salt. Tile systems within the District contribute an average of 4,000 acre feet of saline subsurface drain water to the GBP annually. Tile discharge and water quality estimates are based on District records.

Ultimately, agricultural drainage produced within the GDA will be managed internally with the goal of eliminating all discharge. This will be accomplished through the implementation of the Westside Regional Drainage Plan, a tiered drainage solution plan which includes source control (such as irrigation method improvements), recirculation, drainage reuse and ultimately treatment.

This project is consistent with the goals and objectives of the FCWD's original plan when the District was formed in 1913. Additionally, this project is directly in line with the Plan Elements of the Westside Regional Drainage Plan and the San Luis Feature Re-Evaluation Plan, both of which identify, as the chief components of drainage management, source control, regional re-use, treatment and salt disposal.

The Proposed Project is consistent with the Bay-Delta Restoration Program priorities and will improve water management of approximately 15,600 acre-feet per year through remote monitoring and operation of the proposed check structure replacement. Additional benefits include reduction in vehicle trips to the check structure, saving the district approximately $1500 per year in maintenance costs. Also, fewer vehicle miles to and from the site deliver reduced emissions of approximately 3.6 tons of CO2 per year and an undetermined amount of reduction of soil disturbances which result in poor air quality.

The service area of the Project is 1410 acres. If funding assistance from NRCS (in addition to the District's funding assistance program) becomes available, 800 acres within the project's service area may convert to high-efficiency irrigation methods. These methods improve irrigation water application uniformity and reduce deep percolation past the crop root zone, which contributes to subsurface drainage production. Implementation of high-efficiency irrigation systems is a high priority of the Grassland Bypass Project.

The District has partnered with the U.S. Bureau of Reclamation (Reclamation) on a number of past projects, including successful lining projects. Past working relationships with Reclamation include:

- Firebaugh Canal Water District SCADA Project. This project provided $364,000 in funding for SCADA system upgrades on District pump stations. It was completed in 2009. This project was funded through the CalFed Water Use Efficiency program (federal funds).

- Field Services Funding Partnership Program. Through this program, the U.S. Bureau of Reclamation has partnered with the District to provide up to $50,000 in

funding assistance (with a 50% cost match) over the past several years. This program has allowed the District to line several miles of smaller laterals and install a number of traveling water screens.

- San Joaquin River Salinity Management Program. Through this program, the U.S. Bureau of Reclamation has partnered with Panoche Drainage District and Firebaugh Canal Water District to provide funding assistance for the implementation of the Westside Regional Drainage Plan. In 2009, $1,050,000 was provided to the District to line a two mile portion of Phase 1 of the 2nd Lift Canal.

- The 1st Lift Canal Lining Project. This was a WaterSMART funded project awarded in September 2011 to line 2.6 miles of the District's 1st Lift Canal. The project was completed in 2012 with a construction cost of $1,600,000.

- The 2nd Lift Canal Lining Project, Phase III. This was a WaterSMART funded project awarded in 2012 to line 2.2 miles of the District's 2nd Lift Canal, eliminate an existing booster station and construct a new check structure with SCADA-integrated controls. The project final cost was $1,859,000.

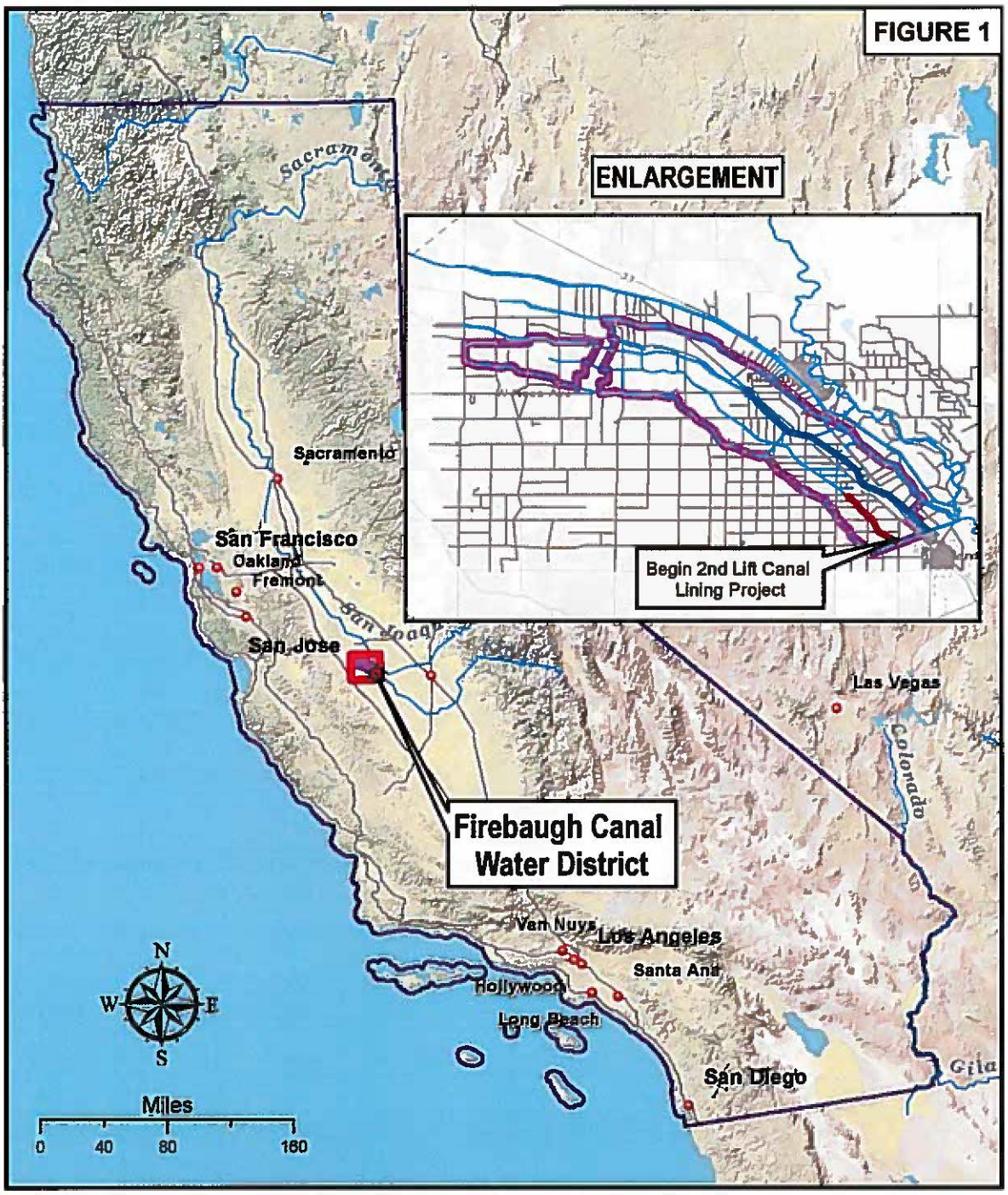
- The 2nd Lift Canal Lining Project, Phase IV. This was an Agricultural Water Conservation and Efficiency Grant funded project awarded in 2014 to line 2.6 miles of the District's 2nd Lift Canal and provide SCADA controls at an existing main pump station. The total cost of this project was $1,947,713, approximately 11% below budget.

- The 1st Lift Canal Lining Project Phase III. This was a Water Use Efficiency grant funded project to line 1.5 miles of the 1st Lift Canal from Shaw Avenue to Check 1 at Highway 33. This project was completed in early 2017 at a cost of $1,179,000.

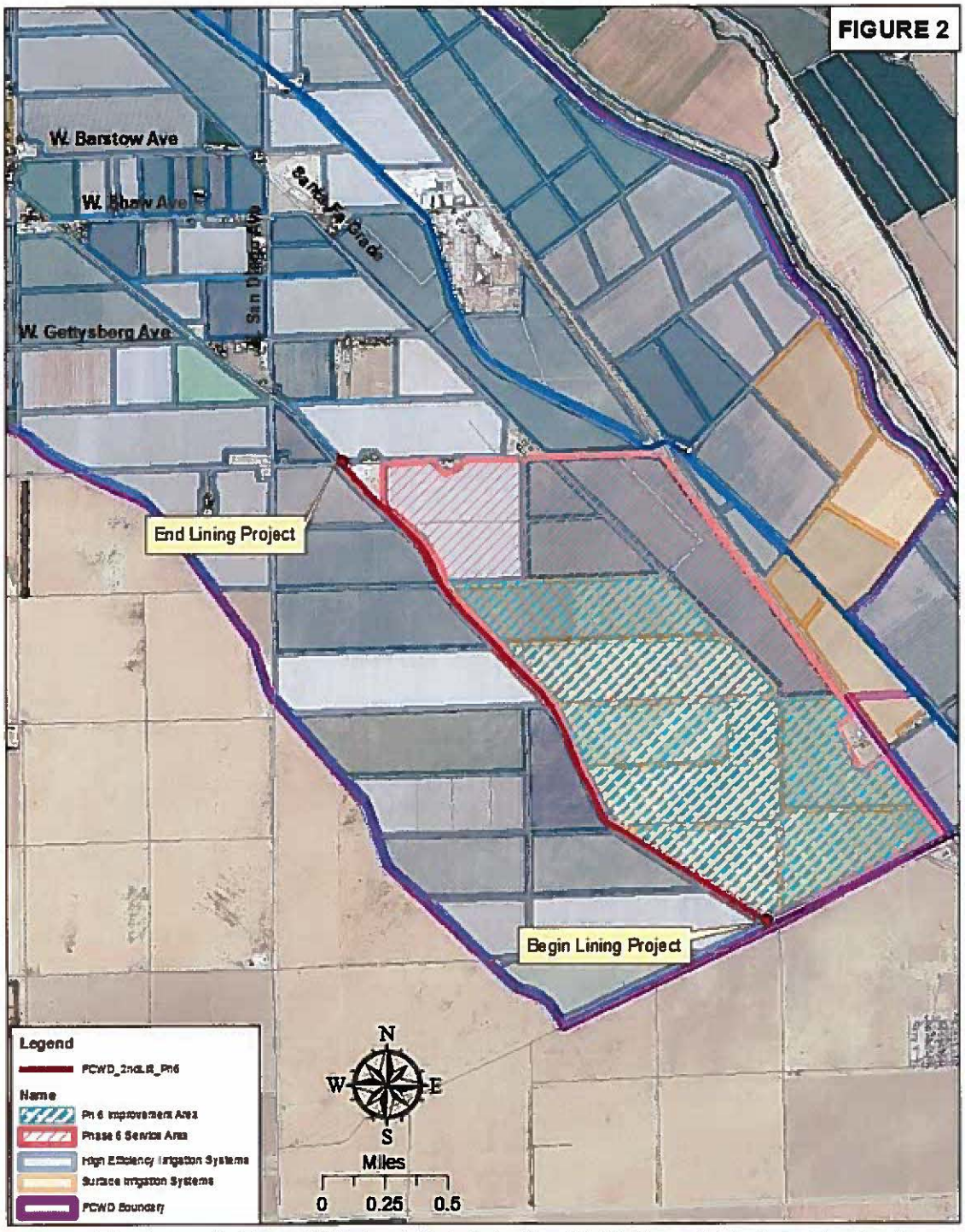
- The 2nd Lift Canal Lining Project Phase V. This project was awarded in 2016 through the Water Use Efficiency grant program and is currently in progress. It will line approximately 1.7 miles of the 2nd Lift Canal. This project was completed in late 2017 at a cost of $1,385,000.

Project Location

Figure 1



Firebaugh Canal Water District - 2nd Lift Canal Lining Project
Phase 6 - Location Map



Firebaugh Canal Water District - 2nd Lift Canal Lining Project
Phase 6 - Project Service Area

The Proposed Project is located northwest of Mendota, California to the west of Highway 33. The project latitude is 36°45.93' and longitude is -120°24.289'.

TECHNICAL PROJECT DESCRIPTION

The proposed project will replace approximately 2.5 miles of the 2nd Lift Canal with a concrete lined canal. The existing turnout structures will be replaced with pre-cast concrete structures that can accommodate the trash screens necessary for high-efficiency irrigation system upgrades. All construction tasks will need to be completed during the non-irrigation season (approximately October to February) so that the canal will be available to provide irrigation deliveries during the irrigation season.

Project Tasks:

- **Environmental Compliance:** The proposed project will improve an existing facility with no increase in capacity or use. The project is categorically exempt (per section 15302(c)) from the California Environmental Quality Act (CEQA). A notice of exemption will be filed with Fresno County prior to construction. The District is prepared to hire a biologist and cultural resource consultant to provide the additional information to the U.S. Bureau of Reclamation required for NEPA compliance.
- **Surveying and Design:** The project alignment will be surveyed by a professional surveyor. Surveying work will include identifying the existing high-water marks, data to define the canal geometry, and detailed topo of the Check 1 location. This data will be used by the engineer to develop a hydraulic model and design drawings. Design drawings will include plan and profile drawings as well as cross-section and turnout details.
- **Acquisition of Right-of-Way:** The canal lining work will occur within District right-of-way and no additional right-of-way will be required. The District's existing right-of-way is sufficient for all construction work and no additional staging areas will be needed. The right-of-way lines will be located in the field by the surveyor.
- **Pre-Project Seepage Study:** A seepage study was completed in 2011 on the 2nd Lift Canal and was used as the basis for estimating the seepage reduction for this proposed project. The seepage study was located approximately 4 miles upstream of the proposed project and FCWD considers results from that study to be representative of seepage rate and does not plan to perform another seepage test. A summary of the results of that study is included in **Appendix A**.
- **Cleanout and Site Preparation:** The existing canal will be dewatered and cleaned of silt and debris. Sufficient time will be provided to allow the existing channel to dry. Areas where the subgrade is soft or over-saturated will require soil stabilization to provide adequate strength for compaction.
- **Earthwork:** The existing channel will be backfilled and compacted to the final design grade according to the drawings. Backfill will be performed by excavators in lifts and compacted with sheep's foot rollers to ensure proper soil density and moisture levels. Surveyed construction stakes will be placed along the project alignment and final grade will be checked against those stakes

- **Prism Excavation and Placement of Lining:** The channel prism will be excavated to the appropriate lines and grade according to the drawings. Concrete lining will be placed in accordance with the drawings and specifications.
- **Turnouts:** Irrigation turnout connections will be installed according to the drawings using pre-cast concrete gate structures and typical irrigation canal gates. The pre-cast gate structures will include slots for trash screens.

EVALUATION CATEGORIES

Criterion A: Quantifiable Water Savings

A.1: Estimated Water Savings. The estimated total conserved volume is 1440 acre-feet per year (320 acre feet in seepage reduction and 1120 acre-feet in water conserved through improved irrigation system). The estimated seepage losses were developed based on a seepage study performed on the 2nd Lift Canal in 2011. A copy of a memo summarizing the findings of District seepage studies is included in **Appendix A**. A memo summarizing the potential water conserved through irrigation improvements is included in **Appendix B**.

The typical water supply delivered by FCWD is 85,000 afy and the 2nd Lift Canal typically delivers 15,600 afy of that supply. Including the water conserved through irrigation improvements, the estimated conserved water amounts to about 9% (1440 afy/15,600 afy) of the water conveyed by this segment of the 2nd Lift Canal and 2% (1440 afy/85,000 afy) of the District's total annual water supply. Considering only seepage reduction, the conserved water amounts to 0.4% (320 afy/85,000 afy) of the FCWD total water supply and 2% (320 afy/15,600 afy) of the water conveyed annually through the 2nd Lift Canal.

A.2: Current Losses

The primary source of current losses are due to seepage from the unlined canal to the local shallow and saline water table. The estimated seepage losses were developed based on a seepage study performed on the 2nd Lift Canal in 2011. A copy of a memo summarizing the findings of District seepage studies is included in **Appendix A**. A memo summarizing the water potential conserved through irrigation improvements is included in **Appendix B**.

Over the decades of operations and maintenance, the 2nd Lift Canal has become much wider than necessary, creating an inefficient cross section that takes a long time and a lot of water to simply fill to operational levels. In addition, the unlined canal is plagued with aquatic vegetation which results in floating detritus that hinders the operation of high-efficient irrigation systems (which require pre-filters to clean out the debris).

A.3: Expected Post-Project Seepage Losses

- Water Saved: The water conserved from the proposed project comes from (1) seepage reduction through placement of the concrete lining and (2) improved irrigation efficiencies through conversion of 800 acres of farm land from conventional surface methods to high-efficiency pressurized systems. For (1) the seepage rate was calculated from the 2011 seepage test performed on the 2nd Lift Canal, amounting to 0.38 af/mi/day * 2.5 miles of lining installed * 340 days of operation = 323 afy (say 320 afy for round numbers). See **Appendix A**.

  For (2) the water conserved through conversion to improved irrigation systems is based on a study performed within FCWD on two cotton fields with different irrigation systems. The net result was a savings of approximately 1.4 af/ac per year * 800 acres = 1120 afy. FCWD has contacted the grower operating the 800 acres within the 2nd Lift Service area and he expects to convert to high-efficiency systems if funding assistance can be made available. See **Appendix B**.

A.4: Anticipated Transit Loss Reductions

- The estimated average annual water savings that will result from the project has been determined from (1) the sum of water lost to seepage per year and (2) water conserved through conversion to improved irrigation systems. For (1) the seepage rate was calculated from the 2011 seepage test performed on the 2nd Lift Canal, amounting to 0.38 af/mi/day * 2.5 miles of lining installed * 340 days of operation = 323 afy (say 320 afy for round numbers). For (2) the water conserved through conversion to improved irrigation systems is based on a study performed within FCWD on two cotton fields with different irrigation systems. The net result was a savings of approximately 1.4 af/ac per year * 800 acres = 1120 afy. The assumption of 800 acres was made by the confirmation that a grower in FCWD expects to convert to high-efficiency irrigation systems if funding assistance is available. See **Appendix C**.

- The estimated annual average seepage losses were developed based on a seepage study performed on the 2nd Lift Canal in 2011. A copy of a memo summarizing the findings of District seepage studies is included in **Appendix A**. A memo summarizing the potential water conserved through irrigation improvements in included in **Appendix B**.

- Expected post-project seepage losses are none because the lining of the canal is made of concrete. This assumption is made through District experience from previous canal lining projects.

- The losses associated with this project are generally limited to seepage losses. There are no operational spills or other transit losses for this project

- Post-Project Seepage Loss Verification. Based on past lining projects, the District expects the canal lining project to effectively eliminate seepage losses and does not intend to do a separate, post-project seepage pond test after construction. However, the District is willing to perform such a test if required by Reclamation.

- Materials: The proposed project will be lined using unreinforced concrete lining, approximately 2.5" thick, pre-cast concrete gate structures, reinforcing steel bars, sluice gates, turnouts, SCADA systems, a rail-car bridge and concrete bridge supports.

Criterion B: Water Supply Reliability.
The proposed project will contribute to local and regional water supply reliability through several means:

Will the project address a specific water reliability concern?

- Seepage from the unlined canal and deep percolation from inefficient irrigation practices contribute to subsurface drainage production which is highly mineralized (including high concentrations of boron, selenium, and salt). The project may address a heightened competition for finite water supplies by providing higher quality and quantity of water for use to the growers that rely on the 2nd lift canal.
- The proposed project aims to improve regional water quality through drainage reduction. Subsurface drain water is managed through recirculation (which degrades local water quality), discharge to the San Joaquin River (which degrades regional water quality all the way to the Sacramento/San Joaquin Delta), as well as other methods.
- Conserving water through seepage reduction. Water lost to seepage mixes with a saline sink and is unusable as a groundwater supply. This conserved water becomes available, locally, to growers within Firebaugh Canal Water District.
- The proposed project will eliminate seepage from this segment of the 2nd Lift Canal and reduce deep percolation from the 840 acres of farmland that will convert to high-efficiency irrigation systems, reducing subsurface drainage production that impacts the local water supply and the San Joaquin River water quality.

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

- The project will benefit the environmental and agricultural sectors by improving the quality and quantity of the irrigation water. Subsurface drainage is highly mineralized water that contains boron, selenium and salt that is recirculated into the irrigation system and degrades local water quality. This water is discharged through the Grassland Bypass Project to the San Joaquin River and eventually, to San Joaquin/Sacramento Delta. Ultimately, seepage prevention leads to reduced drainage discharged into the San Joaquin River.
- The proposed project will not result in a significant change in the surrounding environment and will not have a direct impact to any special status species. However, by reducing the seepage contribution to the local perched water table,

the proposed project will reduce the volume of subsurface drain water produced. This drain water contains salt, boron, and selenium, which could pose threats to sensitive species.

- The proposed project is in line with the Westside Plan, which is an effort by local stakeholders including Westlands, Panoche and Broadview water districts, Central California Irrigation District, Firebaugh Canal Water District, and the San Joaquin River Exchange Contractors Water Authority to curtail discharge to the San Joaquin River in accordance with regulatory constraints. This project falls under the source control aspect of the plan. The Westside Plan can be found in **Appendix D**.
- The proposed project will not affect Indian tribes.
- The proposed project will indirectly benefit the local rural, economically disadvantaged communities of Firebaugh and Mendota by improving the management of irrigation water, which is critical to the rural economy of the region.
- Ultimately, agricultural drainage produced within the GDA will be managed internally with the goal of eliminating all discharge. This will be accomplished through the implementation of the Westside Regional Drainage Plan, a tiered drainage solution plan which includes source control (such as irrigation method improvements), recirculation, drainage reuse and ultimately treatment.

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

- The proposed project has garnered support from growers within the District. Growers who represent 800 acres of irrigated lands within the District (about 13% of the growers within the District that do not employ high efficiency irrigation methods) indicating interest in converting to drip irrigation.
- The significance of collaboration with neighboring water agencies through water marketing is fairly substantial. In most years, the District has sufficient water supply to meet its irrigation demand, while most of the neighboring districts to the West (Panoche Water District, Pacheco Water District, and San Luis Water District) hold appropriative water contracts through the CVP. These districts have reduced allocations in most years and rely heavily on supplemental water supplies, often purchased from riparian water right holders (such as Firebaugh Canal Water District). FCWD has water marketing agreements with several neighboring water agencies which help to stabilize the local water supply. The District intends to market all conserved water to neighboring districts.
- Growers throughout Firebaugh Canal Water District have committed to work with the District to improve water use efficiency. Within the service area of this proposed project, there is only one grower still irrigating with conventional methods. This grower, representing 800 acres within the service area, has committed to supporting the project and shown interest in converting to high-efficiency irrigation systems if the proposed project were to be completed. His letter of support is included in Appendix C.
- The proposed project will not directly prevent water-related crises, however, improvements in regional water use efficiency will help with long-term water supply sustainability.

- There are no partners in the process for this proposed project.

Will this project address water supply reliability in other ways not described above?

- Concrete lining of the 2nd Lift Canal will virtually eliminate the growth of aquatic weeds and reduce the amount of channel cleaning required to maintain the facility. The project will reduce the number of trips district staff will need to make to the canal and the number of hours spent clearing weeds and removing silt. The estimated annual maintenance cost savings is $1,500 (assuming a mileage cost rate of $0.55 and daily round trips of 9 miles). Based on EPA estimates, this will result in a reduction of 3.6 tons CO_2 from reduced vehicle trips.
- A concrete lined canal requires less maintenance than an unlined canal. Earthen canals require aggressive weed and silt management at a cost of approximately $500 per mile per year. While aquatic weed control is still required in a concrete canal, the amount of treatment required is significantly reduced, with a total maintenance cost for a lined canal at approximately $100 per mile per year. For this project, the approximately savings is $1,000 per year.

Criterion C: Implementing Hydropower.
The Proposed Project will not be implementing hydropower systems.

Criterion D: Complementing On-Farm Irrigation Improvements.
The proposed project will reduce suspended silt and aquatic growth, which will improve the function of irrigation system filter stations by reducing the filter backwash frequency and overall maintenance requirements. Although the existing unlined channel does not prohibit the installation of high-efficiency irrigation system, the aquatic growth and suspended silt does cause their operation to be more costly, therefore discouraging their installation. By eliminating these issues, the proposed project will make the installation of high efficiency irrigation systems more attractive to growers.

A major grower within the project service area has indicated that the proposed project will make the installation of drip irrigation systems more attractive to and intends to pursue funding assistance to improve the irrigation systems on these fields (a letter of support is included in **Appendix C**).

Firebaugh Canal Water District also offers an irrigation system improvement funding assistance program to all growers within the District. The program provides a grant amounting to a maximum of 25% of the project cost and a low interest loan for the remainder. Funding for this program is provided entirely through District funds. To date, this program has provided $9.6 million in funding assistance to District growers. In addition to the District's funding assistance program, irrigation improvement projects will also likely qualify for NRCS funding programs such as EQIP or AWEP and the District will assist growers in pursuing funding from those programs.

The upgraded irrigation systems will likely be buried (subsurface) drip systems which will supply precise volumes of water directly to the crop's root system, eliminating surface runoff and the associated contaminants. Additionally, drip irrigation systems allow for the

application of fertilizers and other materials directly through the drip tape – eliminating the need for surface spraying and the associated potential for drift.

Figure 2 shows the 2nd Lift Canal service area as well as the irrigation methods used on each field. Based on conversations with growers in the 2nd Lift service area, the District anticipates that 800 acres of land will be converted to high-efficiency irrigation systems as a result of this project. The volume of water conserved though the installation of these systems is difficult to estimate as it is dependent on the pre-project cultural practices of each grower and the specific crop grown (which will change from year to year). Based on a comparison of furrow irrigated cotton and drip irrigated cotton, the potential water savings could be as high as 1.4 af/ac – amounting to approximately 1120 acre feet per year in conserved water if the full 800 acres within the service area converts to drip (see **Appendix B** for a more detailed discussion).

Criterion E: Department of the Interior Priorities.
The Proposed Project supports the Department of Interior priorities by modernizing infrastructure. The proposed project will replace approximately 2.5 earth miles of the 2nd Lift Canal with a concrete lined. The existing turnout structures will be replaced with pre-cast concrete structures that can accommodate the trash screens necessary for high-efficiency irrigation system upgrades.

The project will remove impediments to infrastructure development by reducing suspended silt and aquatic growth, which in turn will reduce the filter backwash frequency and overall maintenance requirements. Currently, the District spends $1,250 per year sending staff to remove silt and aquatic growth for the proposed project length. The construction of a lined canal will decrease the cyclical maintenance requirements that prevent seepage and reduce head loss.

Although the existing unlined channel does not prohibit the installation of high-efficiency irrigation system, the aquatic growth and suspended silt does discourage their installation. By eliminating these issues, the proposed project will help facilitate efforts by growers to install high efficiency irrigation systems. The installation of high efficiency irrigation systems would, in turn, conserve water for the growers.

Criterion F: Implementation and Results.
Sub-Criterion F.1—Project Planning: The proposed project is consistent with the goals of the San Luis Unit Feature Re-Evaluation (2007), A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (1990), and the Westside Regional Drainage Plan (2003) as a source control component. Portions of the Westside Regional Drainage Plan is included in **Appendix D**. The Westside Regional Drainage Plan was developed to meet selenium, salt and boron water quality standards in the San Joaquin River.

The goals of the Westside Plan are to 1) identify scientifically sound projects proven to be effective in reducing drainage; 2) develop an aggressive implementation plan initially utilizing existing projects documented to be environmentally sound; and 3) curtail

agricultural drainage discharges to the San Joaquin River in accordance with impending regulatory constraints while maintaining the ability to farm.

The plan focuses on regional drainage projects that can be implemented on a short timeline. Drainage must be addressed on a regional basis but must allow for each sub-area's specific needs and resources. The Plan's key management components for the Grassland Drainage Area are: 1) Source Control (such as seepage reduction and improved irrigation uniformity), 2) Groundwater Management, 3) Drainage Reuse Projects, and 4) Drain Water Treatment and/or Salt Disposal. As drainage projects are implemented, they are evaluated for long-term sustainability of the complete solution. The Westside Regional Drainage Plan is also included in the San Luis & Delta-Mendota Water Authority draft Integrated Regional Water Management Plan.

The Proposed project meets these goals by controlling the source of the water through seepage reduction and improved irrigation uniformity. The amount of water conserved from seepage reduction is 320 afy. The District expects to save 1120 afy of water due to its growers converting to high-efficiency irrigation systems as a result of the canal lining project. Water management will also be improved by due to the prevention of aquatic vegetation by the concrete canal lining. Additionally, the proposed project will create a smaller canal, which will be easier for both the District and operators to operate.

Sub-Criterion F.2—Performance Measures: The primary benefit of the proposed project is the reduction in water lost through seepage and the associated reduction in drainage water production from that seepage. This benefit was quantified by 2011 seepage study performed on the 2nd Lift Canal. The District does not intend to repeat the seepage test for this phase of the lining project but is able and willing to if required by Reclamation. The canal lining is assumed to effectively eliminate all seepage losses.

Water conserved through irrigation system improvements can be measured by comparing year to year head gate deliveries as acres converted, which will be mapped by the District.

Sub-Criterion F.3—Readiness to Proceed:

The proposed project is ready to proceed. FCWD has many years' experience in canal lining projects and this project is Phase 6 of the 2nd Lift Canal Lining Project, of which the first phase was completed in 2012 and the most recent phase (Phase 5) was completed in 2017.

Engineering Status: A preliminary hydraulic review of the canal has been completed to determine demand flowrate and needed features (turnouts, check structures and other components). A detailed survey for final design will be completed in August 2018.

Implementation Schedule: A preliminary schedule is below. Note that all construction activities have to occur during the non-irrigation season (October through February) and the preliminary schedule is based on the assumption that NEPA compliance is completed by July of 2020. If NEPA compliance is substantially delayed, it is possible that project

construction could be delayed until the following non-irrigation season. However, even with this delay the project would be completed within 36 months.

- September 2020 – Assumed notice of grant award. Initiate topographic survey work, biological review and cultural resources review.
- November 2020 – Complete survey work and begin design.
- November 2020 – Complete biological and cultural resources review and provide these reports to Reclamation. File Notice of Exemption for CEQA compliance.
- July 2021 – Complete NEPA Process.
- July 2021 – Complete design and publish contract documents.
- September 2021 – Bid project; Select winning bid, issue notice of award and notice to proceed.
- October 2021 – Begin site cleanout and earthwork construction
- November 2021 – Complete earthwork and begin canal lining.
- February 2021 – Complete canal lining and install turnouts.
- July 2021 – Submit final invoicing and prepare draft final report.
- September 2021 – Finalize and submit project final report.

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

The proposed project will upgrade an existing water distribution facility without any increase in capacity or use. Under the California Environmental Quality Act (CEQA), this project is categorically exempt. The District intends to complete an environmental review, cultural resource review, and a biological survey of the project prior to construction, but expects to file a Notice of Exemption to comply with CEQA. Gathered environmental data will be provided to Reclamation to assist with the necessary NEPA documentation.

Criterion G: Nexus to Reclamation Project Categories.
FCWD is not a Reclamation District but receives its water supply through the Central Valley Project (CVP) via the Delta-Mendota Canal by way of an exchange contract. The water use within the District boundaries is entirely for agricultural irrigation and is obtained through an exchange contract with the U.S. Bureau of Reclamation via the Delta-Mendota Canal. The project is located in the San Joaquin River basin in Central California. The proposed project will not affect any tribes.

Criterion H: Additional Non-Federal Funding.
The percentage of non-Federal funding is 56%. This value was found using the following calculation:

$$\$1,303,300 / \$2,303,300 = 56\%.$$

Project Budget

Funding Plan and Letters of Commitment

The funding summary and source of fund breakdown is shown in **Table 2**. Non-federal funds will be provided exclusively by the District.

Table 2: Summary of Non-Federal and Federal Funding Sources

Funding Source	Amount
Firebaugh Canal Water District (non-federal)	$1,303,300
Requested Reclamation Funding	$1,000,000
Total Project Funding	$2,303,300

The total estimated cost of the proposed project is $2,303,300. This cost was calculated based on the District's recent experience in similar canal lining projects (2009 through 2017). This application is requesting $1,000,000 in federal funding assistance and will utilize $1,303,300 in District Funds.

The District's contribution to the project will be through direct funding of administration, design, and construction of the project. The District has budgeted the necessary funds to complete Phase 6 of this project. This funding will be allocated in the District's 2019 budget and is available to complete the project.

The District expects to utilize the federal funding assistance for a portion of the construction costs and utilize District funding for all other costs, including surveying, design, remaining construction, administration, and inspection. The District has not yet incurred any costs that would be used to meet its match obligation. However, in order to meet the required construction schedule, the District intends to begin surveying and design work as well as the environmental review work prior to the award of this grant. These expenditures are estimated to be around $20,000 and would be used as part of the match obligation for the grant.

No other federal funding has been requested at this time, or received for this project.

Budget Proposal.
Table 3. Total Project Cost Tabl

Item No.	Work or Material	Unit Cost	Unit	Quantity	Total Amount
1	**Salaries and Wages**			0	$0
2	**Fringe Benefits**			0	$0
3	**Travel**			0	$0
4	**Equipment**			0	$0
5	**Supplies/Materials**			0	$0
6	**Contractual**				
6.1	Surveying and Staking	$1,200	days	21	$25,200
6.2	Engineering Design	$1,200	days	25	$30,000
6.3	Furnish and Install (F&I) Cleanout and Site Preparation	$18,600	each	1	$18,600
6.4	F&I Recompacted Subgrade	$3	cubic	51,400	$154,200
6.5	F&I Compacted Embankment	$5	cubic	93,800	$469,000
6.6	F&I Soil Stabilization (Lime Treatment)	$16	linear feet	13,500	$216,000
6.7	F&I Lined Canal	$95	linear feet	13,500	$1,282,500
6.8	F&I Turnout Installations	$9,200	each	8	$73,600
6.11	F&I Miscellaneous Metal	$12	lbs	450	$5,400
7	**Other**				
7.1	Reclamation Costs (Assumed)				$0
7.2	Administration and Reporting	$1,200	days	5	$6,000
7.3	Cultural Resources Review (NEPA)	$2,000	days	8	$16,000
7.4	Biological Resources Review (NEPA)	$1,000	days	2	$2,000
7.5	Environmental Compliance and Permits	$1,200	days	4	$4,800
8	**Indirect Costs**				
8.1	Indirect Costs			0	$0
Total Estimated Project Cost:					**$2,303,300**
Requested Grant Amount (43%):					**$1,000,000**
Non-Federal Share (56%):					**$1,303,300**

Budget Narrative.

a. Salaries and Wages. Although District staff will likely spend time administering and supervising the project, the District does not intend to separate that time from other daily duties of the staff. No District staff time will be charged to the project.
b. Fringe Benefits. The District will not charge fringe benefits associated with District staff to this project.
c. Travel. No travel is associated with this project.
d. Equipment. No equipment will be purchased as part of this project.
e. Materials and Supplies. No materials or supplies will be charged to this project.
f. Contractual. The proposed project will make use of a number of consultants and contractors for its completion.
    - Surveyor. A licensed professional surveyor will be used to survey the project alignment, develop topographic data for design, identify right of way limits, and set construction stakes. A surveyor in training (LSIT) and other staff technicians will convert the field data to CAD files for design. The hourly rate depends on the type of work (field work or office work) and the individual performing that work (licensed surveyor, LSIT, or technician). Based on comparisons with similar previous billings on lining projects, the cost of surveying is estimated to be $25,200 for this portion.
    - Engineers. A licensed civil engineer will be used for the pre- and post-project seepage study, hydraulic evaluation, canal and check structure design, development of design drawings and specifications, project administration, and field review of construction progress. Based on comparisons with similar previous billings on lining projects, a cost of $30,000 was estimated for the engineering design and reporting tasks associated with this project.
    - Construction. A general contractor qualified and experienced in earthwork, canal lining projects, and reinforced concrete structures will be used for construction of the canal lining and check structure construction. Estimated quantities and costs for the construction work are based on the unit costs for recent lining projects within the District, most notably the 1st Lift Phase 4, which is similar in size, capacity, and conditions to the proposed project.
        a. Site Cleanout and Preparation. This line item covers the cost to clean up the site, remove built up silt and lay it out on the bank to dry. During this, existing turnout structures will be removed. Estimated cost will be a lump sum of $18,600.
        b. Recompacted Subgrade. The existing cross-section will backfilled and compacted to prepare the alignment for canal prism excavation. Excavators will be used to scrape out the silt, remove the existing structures and backfill the existing channel. A compactor and graders will be used to compact the replaced soil. The unit cost (per cubic yard) for this work was compiled from the 1st Lift Canal Lining Project Phase 4, completed in 2017. Based on survey data and engineering analysis, 51,400 cubic yards of subgrade will need to be excavated and compacted. The estimated cost for this portion is $154,200.
        c. Compacted Embankment. A compactor and graders will be used to compact the soil on the embankment. The unit cost (per cubic yard) for this

is estimated to be $4.50 per cubic yard. The estimated quantity of material is 93,800 cubic yards, based on the cubic yards per mile required for the 2017 1st Lift Canal lining project. The estimated cost for this portion is $469,000.

d. Soil Stabilization. Because of the high groundwater and clay soil conditions, and construction schedule requiring winter construction, all of the alignment is expected to require soil stabilization to condition the subgrade and allow compaction. Based on previous stabilization costs, this cost is estimated at $16 per foot of canal (2016 2nd Lift Canal Lining Project Phase 5 and 2017 1st Lift Canal Lining Project Phase 4). The estimated cost for this portion is $216,000.

e. Lining Placement. Lining placement would include excavation of the canal prism and placement of unreinforced concrete lining. Since the proposed project capacity and topography are similar to the 2nd Lift Canal (Phase 5) and 1st Lift Canal (Phase 4), the cost for lining placement was assumed to be similar at $93.66/foot of canal. This was rounded up to $95/foot. The estimated cost for this portion is $1,282,500.

f. Turnout Installation. Turnout installation includes placement of new pre-cast concrete gate structures, installation of canal gates and PVC turnout pipe, and transition lining placement. The 2nd Lift Canal (Phase 5) and the 1st Life Canal (Phase 4) cost for the turnout installation was $9,188 each which was rounded to $9,200 each for this budget. The estimated cost for this portion is $73,600.

- Other Costs – Project Review and Reporting. Project review includes activities such as construction inspection, schedule monitoring and coordination, and other miscellaneous activities associated with construction management. Reporting in compliance with the grant agreement is included in Other Costs. The District does not have sufficient staff for the additional duties associated with grant reporting and would likely use the District's engineer for reporting. Reporting costs were assumed to take 40 hours of engineering time at $150 per hour ($6,000). This would include invoicing reports, semi-annual reports, and a final project report. No other costs were included in this category.
- Indirect Costs. Indirect costs incurred by the District will not be charged to the project.
- Total Cost. The total estimated project cost is $2,303,300, including $1,000,000. (43%) in Reclamation funds and $1,303,300 (56%) in District funds. The District has sufficient reserves available in its budget to fund any cost overruns or unforeseen costs should they be required.
- Environmental and Regulatory Compliance Compliance.
    a. Reclamation Costs. Because the proposed project consists of upgrading of existing facilities, no significant environmental impacts are expected. CEQA compliance will likely be in the form of a Categorical Exemption. NEPA will require an Environmental Assessment (EA) that will likely result in a Finding of No Significant Impact (FONSI). The proposed project budget includes consultant costs to develop and Initial Study and Notice of Exemption to comply with CEQA. All documents and backup information developed through that process would be provided to Reclamation for the EA. Costs incurred by

Reclamation to develop the EA are not known and were assumed to be $15,000 for administration and reporting.

b. Biological review. In support of the NEPA documentation, the project alignment will be reviewed by a biologist to determine the potential impact to special status species. Based on the biological review for the 2nd Lift Lining Project (Phase 5), this service was assumed to take approximately 2 days for a total cost of $2000.
c. Cultural Resource Consultant. In 2015, the District's entire lift system (including the proposed project) was evaluated for cultural significance and determined to be ineligible for listing a significant cultural resource. In support of the NEPA documentation, it is expected that some additional cultural review will be required. A cultural resource consultant estimated the costs for that work (specific to the proposed project) would be approximately $16,000.

The environmental compliance costs are less than 1% of the estimated project cost. The District has sufficient reserves available to cover additional environmental costs should they be required.

Environmental and Cultural Resources Compliance

The proposed project will upgrade an existing water distribution facility without any increase in capacity or use. Under the California Environmental Quality Act (CEQA), this project is categorically exempt. The District intends to complete an environmental review, cultural resource review, and a biological survey of the project prior to construction, but expects to file a Notice of Exemption to comply with CEQA. Gathered environmental data will be provided to Reclamation to assist with the necessary NEPA documentation.

1. *Will the project impact the surrounding environment? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.*
   The proposed project will involve the placement of compacted embankment and excavation of earth as required to trim the canal to the required cross-section and the construction of a reinforced concrete structure. All work will be performed within the footprint of the existing canal and no habitat will be impacted. Lands surrounding the proposed project are either actively farmed or contain farm support facilities (such as shops and farm houses). The proposed project will not result in the loss of any farm land. The canal will be dewatered during all construction activities and there will be no impact to water quality. There is some potential for dust generation during construction and management practices (such as road watering) will be implemented to minimize those impacts.

2. *Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*
   There are a number of special status species that could potentially be in the project area, including the California tiger salamander, the California red-legged frog, Fresno kangaroo rat, and others. Because the proposed project alignment is actively traveled and maintained and the surrounding area actively farmed, there is limited habitat and it is unlikely that any special status will be in the project area during construction. A qualified biologist will survey the project area prior to construction to determine if there are any special status species in the project area, and will make recommendations for additional actions as required.

3. *Are there wetlands or other surface waters inside the project boundaries potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.*
   There are no wetlands in the project boundary. The proposed project will be constructed within the footprint of the existing canal.

4. *When was the water delivery system constructed?*
   The 2nd Lift Canal was constructed in 1958, as an unlined contour canal to deliver irrigation water to the westerly region of the District. It has been maintained, cleaned, and upgraded on a regular basis since its construction.

5. *Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.*
   There are approximately 9 turnouts (headgates) that will be replaced by the proposed project. The existing turnouts are precast concrete structures with a common canal gate mounted at the back. These structures are replaced regularly by the District and are no more than 20 years old. The new turnouts installed by the proposed project will be precast concrete structures with additional slots to accommodate trash screens. Check 1 will also be replaced by the project. It was constructed with the original canal in 1958.

6. *Are any building, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?*
   There are no buildings, structures or features within the District listed in the National Register. The District is not aware of any features that are eligible for listing.

7. *Are there any known archeological sites in the proposed project area?*
   There are no known archeological sites in the proposed project area.

8. *Will the project have a disproportionately high and adverse effect on low income or minority populations?*
   The proposed project will have no impact on low income or minority populations.

9. *Will the project limit access or ceremonial use of Indian sacred sites or impact tribal lands?*
   There are no tribal lands within the project or its service area. The proposed project will have no impact on tribal lands.

10. *Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species in the area?*
    The project will have no impact on noxious weeds or non-native species compared to existing conditions.

Required Permits or Approvals

All work related to the proposed project will occur within District right-of-way and on facilities owned by the District. No permits or approvals are required. The project will need to comply with the applicable provisions of NEPA and CEQA.

Letters of Support

Letters of support from interested stakeholders is included in this proposal as **Appendix C**.

Official Resolution

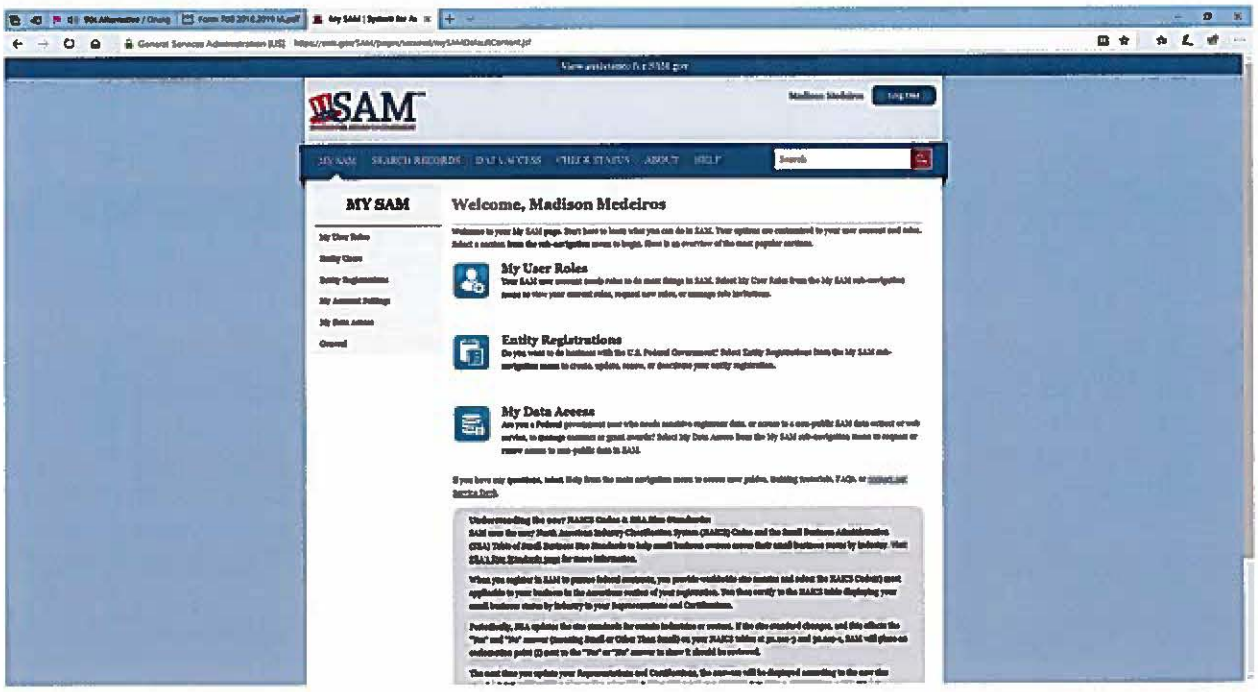
An official resolution is included in this proposal as **Appendix F**.

ASAP Registration

FCWD maintains a registration with the Automated System Application for Payment (ASAP) system.

SAM Registration

FCWD maintains a registration with the System of Award Management (SAM) system. A screen shot of the SAM Log-in page is shown in the image below. Note that Madison Medeiros is the authorized agent for FCWD.



Disclosure of Lobbying Activities

FCWD does not retain a state or federal lobbyist. A complete SF-LLL form is attached at the beginning of this proposal.

APPENDIX A

2012 Seepage Study Memo

SUMMERS ENGINEERING
887 N. Irwin St. – PO Box 1122
Hanford, CA 93232

MEMORANDUM

TO: Firebaugh Canal Water District

FROM: Chris Linneman

DATE: May 8, 2012

SUBJECT: 2nd Lift Canal Lining Project, Phase II – Pre-project Seepage Study.

In October 2010, Firebaugh Canal Water District (District) performed a seepage study on a portion of the 2nd Lift Canal near Bullard Avenue. The intent of the seepage test was to estimate to volume of water lost to seepage and subsequently conserved through the lining project.

The seepage study was initiated on October 13 and completed on October 21. Measurements of water level and evaporation pan were measured twice daily. The water level in the test pool was initially set near the normal canal operating level. At the completion of the test, the collected data was compiled and an estimated seepage rate was calculated to be approximately 0.38 acre feet per mile per day (corrected for evaporation and precipitation).

Phases I and II of the 2nd Lift Canal Lining Project have lined a total of 5.3 miles of canal, conserving an estimated 680 acre feet per year.

Test calculations are attached.

Firebaugh Canal Water District - 2nd Lift Seepage Study

Date/time	Time (Days)	Stage	Stage (Evap Adj)	Elevation	Volume (cf)	Vol. Loss (cf)	Evap Pan
10/13/10 12:00 PM		0	0.00				6
	0.104166667						
10/13/10 2:30 PM		3	3.00	96.59	21150	0.0	6
	0.791666667						
10/14/10 9:30 AM		2.9	2.92	96.51	20663	487	5.75
	0.208333333						
10/14/10 2:30 PM		2.88	2.88	96.47	20414	249	5.75
	0.770833333						
10/15/10 9:00 AM		2.78	2.79	96.38	19871	543	5.625
	0.229166667						
10/15/10 2:30 PM		2.75	2.75	96.34	19628	243	5.625
	0.770833333						
10/16/10 9:00 AM		2.68	2.69	96.28	19271	357	5.5
	0.291666667						
10/16/10 4:00 PM		2.65	2.65	96.24	19031	240	5.5
	0.708333333						
10/17/10 9:00 AM		2.58	2.60	96.19	18740	291	5.25
	0.291666667						
10/17/10 4:00 PM		2.56	2.56	96.15	18499	240	5.25
	0.791666667						
10/18/10 11:00 AM		2.5	2.51	96.10	18209	290	5.125
	0.173611111						
10/18/10 3:10 PM		2.5	2.50	96.09	18148	61	5.125
	0.763888889						
10/19/10 9:30 AM		2.45	2.46	96.05	17917	230	5
10/19/10 10:25 AM		3	3.00	96.59	21150		5
	0.163194444						
10/19/10 2:20 PM		2.97	2.97	96.56	20965	185	5
	0.798611111						
10/20/10 9:30 AM		2.9	2.91	96.50	20600	365	4.875
	0.21875						
10/20/10 2:45 PM		2.88	2.88	96.47	20414	186	4.875
	0.760416667						
10/21/10 9:00 AM		2.82	2.83	96.42	20113	301	4.75
	0.270833333						
10/21/10 3:30 PM		2.79	2.79	96.38	19868	244	4.75

Summary

Total Vol. Loss:	4514.1	cf
Pond Length:	181.00	feet
Duration:	8.00	days
Avg Loss:	3.12	cf/day/ft of canal
Avg Loss:	0.38	af/day/mi of canal

APPENDIX B

Estimate of Water Conserved through Irrigation Improvements

SUMMERS ENGINEERING
887 N. Irwin St. – PO Box 1122
Hanford, CA 93232

MEMORANDUM

TO: Jeff Bryant, Firebaugh Canal Water District

FROM: Chris Linneman

DATE: February 14, 2011

SUBJECT: Estimated Conserved Water from Lining and Piping Projects

At the request of the District, Summers Engineering has estimated the annual volume of water conserved by conveyance facility improvements that have been completed. **Table 1**, below, lists the projects that will be completed by April 1, 2011. **Figure 1** shows the location of those projects within the District. These projects are assumed to have eliminated the associated seepage losses.

Table 1: Completed and Future Distribution System Improvement Projects.

Lateral	Lined Length	Irrigation Run
	(miles)	(days)
2nd Lift (Phase 1)	2.11	340
2nd Lift (Phase 2)	3.15	340
3rd Lift	3.28	340
Lateral 1-2a	2.42	300
Brannon Lateral	1.25	300
Forchey Lateral	2.17	300
Shaw Ave. Pipeline	0.87	280
Completed Length:	15.25	

Seepage studies were performed on the 3rd Lift Canal and the 2nd Lift Canal, which represent the major canal lining projects completed by the District. Results from these studies were used to calculate an average volume of water lost to seepage in terms of acre feet per mile per day. An average of the 3rd Lift and 2nd Lift Canal seepage rates was used to estimate the seepage rates for the other facilities that have been improved.

Table 2 shows the estimated seepage rate for each of the conveyance facilities. The estimated conserved volume of water for projects that will have been completed as of April 1, 2011 is **3,143 acre feet per year**.

Table 2: Conserved Water from Current and Future Conveyance Facility Improvements.

Lateral	Lined Length	Irrigation Run	Seepage Rate	Est. Conserved Volume
	(miles)	(days)	(af/mi/day)	(af/year)
2nd Lift (Phase 1 & 2)	5.26	340	0.38	680
3rd Lift	3.28	340	0.69	769
Lateral 1-2a	2.42	300	**0.5**	363
Brannon Lateral	1.25	300	**0.5**	187
Forchey Lateral	2.17	300	**0.5**	325
Shaw Ave. Pipeline	0.87	280	**0.5**	122
Smaller Laterals	7.74	180	**0.5**	697
		Current Conserved Volume:		3,143

Seepage Study Methodology.

Seepage studies were performed in small reaches of both the 3rd Lift Canal (2007) and the 2nd Lift Canal (2010). The following methodology was generally the same for both studies:

- A 200± foot segment of the canal was dammed off. Plastic liners were placed on the inside faces of both dams to prevent seepage through the dams. A staff gage was placed in the pond.
- A detailed topographic survey of the seepage pond was performed. The topo data was used to develop a volume to depth curve so that the volume of water within the pond would be known for any staff gage reading.
- An evaporation pan and rain gage were placed near the pond site to account for precipitation and evaporation contributions.
- The pond was filled to normal operating levels.
- Data collection occurred twice daily, with morning and afternoon reading of water level, evaporation, and precipitation. The date, time and value of each measurement were recorded on a field sheet.
- Once the water level in the pond dropped by 6 inches, it was refilled back to normal operating level. The pond level and time were noted prior to refilling the pond, and again after the pond level was returned to operating conditions.

The seepage study was run for a minimum of one week. Data from the seepage study and topographic survey was used to calculate an average volume of water lost to seepage (in acre feet) per day of the study. From this, an estimate of the seepage loss in terms of acre-feet per day per mile of canal was calculated and used in **Table 2** (above) to determine the estimated volume recovered per irrigation season for the lined reach of each facility.

Seepage Study Results.

The 3rd Lift Canal seepage study measured a total loss of 18,400 cubic feet of water over a 216 ft pond and a 15 day period – an average loss of ([18,400/216/15]*[5280/43560]) 0.69 af per mile of canal per day. The 2nd Lift Canal seepage study measured 4575 cubic feet of loss over 8 days on a 181 foot long pond. This averaged out to 0.38 af per mile of canal per day.

APPENDIX C

Letters of Interest in NRCS Funding from Grower

D and V McCurdy Farms
P.O. Box 488
Firebaugh, CA 93622

September 16, 2019

Mr. Jeff Bryant
Firebaugh Canal Water District
PO Box 97
Mendota, CA 93640

SUBJECT: 2nd Lift Canal Lining Project – Irrigation System Improvement Funding Assistance.

Dear Jeff,

I operate a farm within the 2nd Lift Canal service area which is currently irrigated using a conventional surface irrigation method and have been considering upgrading to a high-efficiency drip system as a means to improve yields, conserve water, and eliminate tailwater discharges.

As you indicated, I understand Firebaugh Canal Water District is pursuing a grant opportunity with the U.S. Bureau of Reclamation which might make my farm eligible for NRCS funding in addition to FCWD's Water Conservation program. I am very much interested in pursuing the funding assistance if the grant is awarded for my 823 acres served by the 2nd Lift Canal.

Very truly yours,

Dan McCurdy

APPENDIX D

Westside Regional Drainage Plan

Westside Regional Drainage Plan

May 2003

Prepared By:

San Joaquin River Exchange Contractors Water Authority

Broadview Water District

Panoche Water District

Westlands Water District

Westside Regional Drainage Plan

AN OVERVIEW

Background:

The U.S. Bureau of Reclamation recently completed a San Luis Drain Feature Re-Evaluation Plan Formulation Report for the area located in the western San Joaquin Valley. The area consists of Westlands, Broadview, Panoche, Firebaugh, and Pacheco water districts and portions of San Luis Water District and Central California Irrigation District.

Long-established drainage practices for farmers in the north portion of the drainage service area are at immediate risk. Impending discharge standards will cut off vital drainage to the San Joaquin River by 2009. The Westside Regional Drainage Plan (Plan) is developed by the stakeholders and is designed primarily to quick-start identified drainage elements in time to meet standards. The initial projects in the Plan are the first steps needed for implementation of the USBR's San Luis Drain Feature Re-Evaluation Plan Formulation Report.

Plan Elements:

- The Plan identifies scientifically sound projects, develops an aggressive implementation plan, curtails discharge to the San Joaquin River in accordance with regulatory constraints.
- Accelerates Plan schedule by using existing adopted environmental documentation. The schedule provides for immediate drainage service implementation.
- Is fully supported by the local stakeholders including Westlands, Panoche and Broadview water districts, Central California Irrigation District, Firebaugh Canal Water District, and the San Joaquin River Exchange Contractors Water Authority.
- The local stakeholders are dedicated to working cooperatively with the USBR to achieve immediate implementation.
- Is consistent with the USBR's San Luis Drain Feature Re-Evaluation Plan Formulation Report. The main difference is the accelerated schedule for the provision of drainage.
- A key element is adaptive management combining investigation, construction of proven drainage components, and operational experience to perfect the final drainage strategy.
- The chief components include land retirement, groundwater management, source control, regional re-use, treatment, and salt disposal.

Table of Contents

Executive Summary

Drainage on the westside of the San Joaquin Valley has been studied for decades. Enormous investments of time and money have been spent developing theoretical drainage reduction strategies. Although many strategies are known to be effective, few projects have been implemented. For over 50 years, both State and Federal planners have recognized the need for a special drainage plan for the region. However, little has been done to actually implement such a plan.

Drainage for farmers in and adjacent to the Central Valley Project's San Luis Unit service area is at a crisis point. Present regulatory requirements for discharge from these lands to the San Joaquin River are nearly impossible to meet. Impending discharge standards will cut off current vital drainage to the San Joaquin River by 2009.

The Westside Regional Drainage Plan (Plan) is intended to: 1) identify scientifically sound projects proven to be effective by the government, local agencies and private consultants; 2) develop an aggressive implementation plan initially utilizing existing projects documented to be environmentally sound; and 3) curtail discharges to the San Joaquin River in accordance with impending regulatory constraints while maintaining the ability to farm.

Local stakeholders have formulated this Plan by integrating all consistent elements developed by government, local agencies, and private partnerships. Local stakeholders are dedicated to working cooperatively with the U.S. Bureau of Reclamation (USBR) to achieve immediate implementation.

The Plan focuses on regional drainage projects implemented on a short timeline. The initial projects of this Plan are the first steps needed for any of the Drainage Service Alternatives identified by USBR in their San Luis Drain Feature Re-Evaluation (Re-Evaluation) Plan Formulation Report, December 2002. Once these regional projects are in place, final disposal projects will be implemented. We concur with USBR that in-valley disposal appears to be the preferred alternative when considering cost, time to implement, implementation complexity, and environmental concerns. The Drainage Service Area is presented on Exhibit A. Identically to the Re-Evaluation, components include drain water reduction measures, irrigation drainage management, drainage collection, and drainage reuse. The Plan coordinates all strategies to meet regulatory requirements on time, to protect the environment and to sustain agriculture.

Adaptive management and implementation of drainage projects are essential. An educated landowners' group, working cooperatively with Federal, State and local agencies, and environmental interests, is the key for successful management. Local knowledge and cooperation, together with the resources of the State and Federal governments will ensure viable projects.

Drainage on the westside must be addressed on a regional basis. However, local districts and entities within each sub-area have specific needs and resources. The Plan for each sub-area must allow for implementation of the most efficient and effective specific drainage management while integrating these practices into one comprehensive program. Drainage cannot be effectively managed without equitably addressing each sub-area.

The Plan's key management components are: (1) Land Retirement, (2) Groundwater Management, (3) Source Control, (4) Regional Reuse Projects, (5) Drain Water Treatment, and (6) Salt Disposal. Each sub-area will implement a different suite of management practices that will be coordinated to alleviate drainage impacts throughout the region. By implementing management practices in the most effective areas, past, present and future drainage impacts will be mitigated.

Executive Summary Continued

As this coordinated drainage program is implemented, stakeholders will evaluate the long-term sustainability of the complete solution. The first phase of the Plan will be to implement the projects consistent with any ultimate disposal option. We concur with USBR that the preferred alternative is in-Valley treatment and disposal.

The implementation schedule for Phase I projects provides the time needed to perfect and implement the in-Valley option. If treatment proves ineffective, then the Plan provides the necessary immediate drainage relief and time to implement other disposal alternatives.

USBR has analyzed the proposed plan to retire up to 200,000 acres of land within the Westlands Water District. The San Luis Drain Feature Re-Evaluation identifies the remaining quality and quantity of drain water disposal required. The Re-Evaluation recalculates the costs of collection, conveyance, reuse, treatment and disposal. The cost savings to provide drainage by retiring 200,000 acres is on average 33% less expensive than without land retirement.

Background

The United States understood the need for drainage service for the San Luis Unit even before its initial authorization. The San Luis Drain was originally designed to transport drainage flows to the Sacramento-San Joaquin Delta for disposal to the ocean. The upper reaches of the San Luis Drain and Kesterson Regulating Reservoir were constructed, but due to political and environmental concerns, construction was never completed to the Delta. The drain was ordered closed during the mid-1980s creating the drainage dilemma we face today. In order to develop a long-term plan to provide drainage service to the westside, the State and Federal governments initiated the interagency San Joaquin Valley Drainage Program.

In 1990, the San Joaquin Valley Drainage Program published A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley, Final Report of the San Joaquin Valley Drainage Program (The "Rainbow Report"). The Rainbow Report outlined a management plan that included all of the key management practices contained in this Plan. In January 2000, the San Joaquin Valley Drainage Implementation Program issued a report titled Final Report, Evaluation of the 1990 Drainage Management Plan for the Westside San Joaquin Valley, California (2000 SJVDIP Report). The 2000 SJVDIP Report also identified the key management practices included in this Regional Drainage Plan. Currently, USBR has just completed the San Luis Drainage Feature Re-Evaluation to once again identify alternatives to provide drainage service to the Westside of the San Joaquin Valley. The key components of the USBR's current Re-evaluation effort are included in this Plan. The main difference between the USBR's efforts and this Plan are the inclusion of an adaptive management approach, shorter implementation timeline, and reduced cost of design, construction, and operation.

The adaptive management component of this Plan will allow the local interests to work with the USBR and other State and Federal agencies to adapt to practical experience gained through the continued implementation of on-the-ground projects. The local interests understand from experience with operating drainage projects that a successful effort must adapt to new information gained through constant evaluation of in-progress projects. The short implementation timeline of this Plan is essential in order to provide meaningful drainage service to the region. The regulatory constraints being imposed by various State and Federal agencies do not allow the region to wait while the USBR completes its study and begins design of a drainage alternative; drainage service is needed immediately. The Grassland Drainage Area must reduce its selenium discharges by 42% within the next three years and 55% percent within the next six years to meet regulatory requirements. Additional water quality regulations are being imposed on the region that further necessitates immediate action.

These regulatory constraints on drainage discharges further exacerbate the impacts to local growers. Shallow groundwater levels continue to rise causing serious impacts to crop production. Groundwater levels must be managed in order to prevent further hardships to family farmers and crop productivity. Large-scale drainage projects are needed immediately to provide meaningful relief from drainage-related impacts.

Background

- **No Valley-wide master drain**
- **Focus on in-Valley drainage management**

- **WRDP vs. USBR Re-evaluation:**
  - Timely implementation
  - Adaptive management approach
  - Reduced design, construction and operation costs

- **Immediate need:**
  - Impending water quality regulations
  - Groundwater levels pose threat to crop productivity

Current Drainage Management Activities

Significant drainage control efforts are ongoing within the Drainage Service Area. (See Exhibit B.) The efforts have been implemented to respond to the specific needs of the different sub-areas. The Drainage Service Area has been subdivided into five sub-areas; 1) the San Luis Unit Sub-area; 2) the Exchange Contractors Sub-area 3) the Northern Westlands Sub-area, 4) the Central Westlands Sub-area, and; 5) the Southern Westlands Sub-area.

Drainage Service Area:

Five sub-areas:

- **San Luis Unit Sub-area**
- **Exchange Contractors Sub-area**
- **Northern Westlands Sub-area**
- **Central Westlands Sub-area**
- **Southern Westlands Sub-area**

Grassland Drainage Area

The Grassland Drainage Area is comprised of the San Luis Unit and Exchange Contractors sub-areas. The Grassland Drainage Area formed a regional drainage entity in March 1996 under the umbrella of the San Luis and Delta-Mendota Water Authority to implement the Grassland Bypass Project. Participants include the Broadview Water District, Charleston Drainage District, Firebaugh Canal Water District, Pacheco Water District, Panoche Drainage District, Widren Water District, and the Camp 13 Drainage District, located in part of Central California Irrigation District. The area comprises approximately 97,000 gross acres of irrigated farmland on the westside of the San Joaquin Valley. The area is highly productive, producing an estimated $113 million annually in agricultural crop market value, with an additional estimated $126 million generated for the local and regional economies, for a total estimated annual economic value of $239 million.

Photo Credit: Gary Zahm, USFWS

The Grassland Drainage Area farmers have implemented several activities aimed at reducing discharge of subsurface drainage waters to the San Joaquin River. These activities include the Grassland Bypass Project, the San Joaquin River Water Quality Improvement Project, formation of a regional drainage entity, distribution of newsletters and other farmer-oriented education series, development of a monitoring program, use of State Revolving Fund loans for improved irrigation systems, development and implementation of drainage recycling systems to mix subsurface drainage water with irrigation supplies under strict limits, tiered water pricing and tradable loads programs.

Grassland Drainage Area

- **Includes San Luis Unit and Exchange Contractors Sub-areas**
- **97,000 gross acres; total annual economic value of $239-million**
- **Programs already in place:**
  - Grassland Bypass Project
  - SJR Water Quality Improvement Project
  - Regional Drainage entity
  - Communication, education and monitoring programs
  - Irrigation improvements
  - Drainage recycling
  - Tiered pricing

Current Drainage Management Activities Continued

Grassland Bypass Project

The entities within the Grassland Drainage Area have implemented the Grassland Bypass Project, an innovative program designed to improve water quality in drainage channels now used to deliver water to wetland areas. Prior to the project, subsurface drainage water was conveyed through these channels to the San Joaquin River and limited their availability to deliver habitat supplies. The Project consolidates subsurface drainage flows regionally and utilizes a portion of the federal San Luis Drain to convey the flows around the habitat areas to the San Joaquin River downstream of the Merced River confluence.

Negotiations between the San Luis and Delta-Mendota Water Authority and the USBR to utilize a portion of the San Luis Drain for the Project commenced in 1988. Stakeholders included in the process were the U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service, California Department of Fish and Game, the Central Valley Regional Water Quality Control Board, Environmental Defense, Contra Costa County, and Contra Costa Water District.

In late 1995, environmental documentation for the first five years of the project was completed and an agreement was signed. Discharge through the project began in September 1996. In September 2001, the agreement was extended for another 8 years and 3 months through December 2009. An Environmental Impact Report/Environmental Impact Statement (EIR/EIS) was completed. On September 7, 2001, the Central Valley Regional Water Quality Control Board issued new Waste Discharge Requirements for the project. In addition, a Biological Assessment/Biological Opinion was completed as well as Total Maximum Monthly Load (TMML) reports submitted to the Regional Board and EPA. The agreement requires continued reductions in selenium discharge until ultimately TMML limits are achieved in 2005 for above-normal and wet years, and continued progress is made to meet water quality objectives in 2010 for below-normal, dry and critically dry years.

The benefits of the Grassland Bypass Project are well documented. In water year (WY) 2001, drainage volume was reduced by 47%, selenium load was reduced 56%, salt load reduced 28% and boron load reduced 41% compared to the pre-project conditions in WY 1996. In WY 1996, prior to the Grassland Bypass Project, the mean selenium concentration in Salt Slough at Lander Avenue was 16 parts per billion (ppb). Since October 1996, the 2 ppb water quality objective for Salt Slough has been met in all months except in February 1998 when uncontrollable flood flows were mixed with subsurface drainage water and could not be contained within the Grassland Bypass Project (that month the selenium concentration in Salt Slough was 4 ppb). In WY 1996, the mean selenium concentration at Camp 13 Ditch was 55.9 parts per billion (ppb). In WY 1997, the first year of operation of the Grassland Bypass Project, the mean selenium concentration at Camp 13 Ditch was 2.6 ppb. This value was slightly above the wetland selenium objective of 2 ppb. In April 1998, specific actions were taken to eliminate any possible subsurface drainage discharges from the Grassland Drainage Area into the Camp 13 Slough and other discharge points. Since that time, there have been no discharges from the Grassland Drainage Area into wetland channels.

Grassland Bypass Project

- **Consolidates regional subsurface flows**
- **Utilizes San Luis Drain to convey water around habitat areas for strategic SJR discharge**
- **Meets waste discharge requirement**
- **Meets Selenium TMDLs**
- **2001 results:**
  - Water volume down by 47%
  - Selenium load down by 56%
  - Salt load down by 28%
  - Boron load down by 41%

Current Drainage Management Activities Continued

San Joaquin River Water Quality Improvement Project

The San Joaquin River Water Quality Improvement Project (SJRIP) is a major project undertaken by Grassland Drainage Area entities. The project, covered under the 2001 EIR/EIS, used Proposition 13 funds to purchase and improve 4,000 acres of land within the Grassland Drainage Area for the purpose of drainage water treatment and disposal. The initial Phase 1 projects of the SJRIP were implemented in the winter of 2001 with the planting of salt tolerant crops and construction of distribution facilities, which allowed for 1,821 acres to be irrigated with drainage water and/or blended water.

Photo Credit: Gary Zahm, USFWS

As a result, 1,025 pounds of selenium, 14,500 tons of salt, and 62,000 pounds of boron were retained and not discharged to the Grassland Bypass Project and to the San Joaquin River. The SJRIP project is the key component for the Grassland Drainage Area as a whole to meet future selenium load limits. This project will ultimately allow for planting and irrigation of the entire 4,000 acres with drainage water. Future phases call for acquisition of additional acreage, installation of subsurface drainage systems and implementation of treatment and salt disposal components.

A component of this future phase, the Grassland Integrated Drainage Management Project, is being implemented with Proposition 13 funds. Subsurface drains are being installed in 550 acres within the SJRIP area and irrigation systems improvements are underway so drainage water can be applied to this land and associated crops.

San Joaquin River Water Quality Improvement Project

SJR Water Quality Improvement Project:

- Salt-tolerant crops irrigated with drainage water
- Project is key component to help meet any discharge load limit.
- Improve acres in Grassland Drainage Area
- Drainage water treatment and disposal

Groundwater Management Pilot Project

In 2002, the San Joaquin River Exchange Contractors Water Authority (Exchange Contractors) in cooperation with the USBR implemented a pilot project to study the feasibility of using groundwater pumping to mitigate drainage impacts. The project involves pumping two wells above the Corcoran Clay but below the shallow groundwater. Although this water supply does contain elevated levels of salt, it contains no selenium.

This water supply is diverted into a surface supply canal and put to beneficial use on surrounding lands and refuges. In addition to the water supply being made available, the project also included monitoring of the shallow groundwater levels and discharges of nearby tile sumps. The 2002 project has demonstrated significant lowering of the crop root zone water levels by pumping groundwater from within the sierran sands located above the Corcoran Clay but below shallow selenium laden groundwater. It has long been identified that the sierran sands reduce selenium and can eliminate the constituent from groundwater discharges. This pilot project also showed reductions in nearby tile sump outputs.

The pilot project indicates that expansion of the groundwater management program is a viable component of the long-term drainage plan. Additionally, extensive modeling has demonstrated significant drain water source reduction benefits

Current Drainage Management Activities Continued

from groundwater pumping. Figure 1 (See Page 21) presents the modeled estimations of drainage discharge from the Exchange Contractors sub-area assuming several land retirement and pumping combination alternatives. The modeling results show that a carefully crafted and implemented groundwater management program alone can result in significant source reduction.

Groundwater Management Pilot Project:

- **Using groundwater pumping to mitigate impacts**
- **Reduced crop root zone water levels**
- **Pumped zones are above Corcoran Clay, below shallow groundwater**

Westlands Drainage Area

Westlands Water District (Westlands) includes more than 560,000 irrigated acres of diversified crops on some of the most productive soil in the world. Large portions of the westside of the San Joaquin Valley are affected by salinity and drainage problems. This affected area includes approximately 200,000 acres of farmland within Westlands. The U.S. government has long been aware of these problems, and congressional authorization of the facilities to deliver Central Valley Project (CVP) water to Westlands mandated drainage service as part of this project. Accordingly, provisions for drainage service were expressly included in Westlands water service contract with the USBR.

Construction of drainage facilities began in 1968. By 1975, concerns over costs and possible environmental issues led to a suspension in construction. Increased environmental concerns led to the closure of existing drainage facilities in 1986, and Westlands and other districts served by the San Luis Unit of the CVP have been without drainage service since that time.

In 1999, Westlands initiated a process to purchase approximately 14,000 acres of land with shallow groundwater problems and within the area identified by the USBR as needing drainage service.

In addition, 1,443 acres have been retired under the USBR's Land Retirement Demonstration Project. As the land was purchased, the water supply that was historically applied to that land was reallocated to the remaining lands in the District. The District developed an agricultural lease program for these lands, which allows lessees to dry land farm and maintain it according to District specifications. The USBR has been using its land for habitat restoration.

In 2002, Westlands approved an agreement to settle that portion of *Sagouspe, et al., v. Westlands Water District*, et al., concerning how the District will allocate Central Valley Project water to the Area I Lands and Area II Lands after December 31, 2007, or after a long-term renewal contract, which is currently being negotiated with the USBR, is executed and becomes effective. The agreement is the product of lengthy negotiations between Area I and Area II representatives. Under the settlement agreement, the District will acquire additional lands and the water appurtenant to those lands will be allocated as provided in the settlement agreement.

The proposed plan shows acquisition of 100,175 irrigable acres through the issuance of debt. This total includes the 13,978 acres previously taken out of agricultural production and lands to be acquired through the settlement of other litigation. These lands will be temporarily fallowed and managed by the District.

Westlands Drainage Area:

- **No natural drainage**
- **No drainage service since 1986**
- **District land buy-out program**
- **Proposed plan shows acquisition of 100,175**

Key Management Practices

This Regional Drainage Plan proposes the expansion of the current drainage management practices into a comprehensive sustainable drainage program. In order to implement a sustainable drainage program, all management practices must be integrated to provide long-term salt balance in the region. While the goal of salt balance is the same for each sub-area, the most efficient suite of management practices designed to achieve salt balance may vary among sub-areas. Therefore, each sub-area will emphasize different management practices in their drainage program.

With the goal of maintaining a salt balance in the region, the management plan will implement on-the-ground management practices on an increasingly larger scale. As practices are shown to be effective they will be expanded. The process will build upon past research and evolve into a fully developed integrated in-Valley drainage control effort. The districts will implement drainage control efforts appropriate for their specific needs. The implementation of the district efforts will be coordinated with input from USBR and will be integrated into one comprehensive program.

The key management practices are: (1) Land Retirement (2) Groundwater Management (3) Source Control (4) Regional Reuse Projects (5) Drain Water Treatment (6) Salt Disposal. These components are described in more detail below.

Photo Credit: Central California Irrigation District

Key Management Practices for a Sustainable Drainage Program:

- **Land Retirement**
- **Groundwater Management**
- **Source Control**
- **Regional Reuse Projects**
- **Drainage Water Treatment**
- **Salt Disposal**

Land Retirement

Land retirement is a key component of the Plan. By retiring drainage impacted land on a voluntary basis the need for future drainage service on these lands will be reduced. The retired lands will no longer be irrigated with surface supplies, which will reduce the impacts of deep percolation from these lands. To the extent possible, groundwater pumping will continue throughout the areas where land retirement occurs. Modeling shows a significant drain water source reduction from such a combination.

The land will become available for other uses such as regional drainage reuse projects, commercial and industrial use, flood control, surface water storage where appropriate, and wildlife habitat. Each project will be strategically located to maximize the benefits to the region. For example, drainage reuse projects will be located to maximize their ability to mitigate past drainage impacts and eliminate future regional impacts from land that remains in production. Each land use choice will be coordinated into an overall program designed to maintain a viable environment and economy.

The land retirement component of the Plan will be to buy land from willing sellers in areas currently impacted by shallow groundwater. The water supply from this land will remain with the region so long as appropriate drainage mitigation programs are effectively implemented consistent with this Plan. Specific measurable criteria will be developed to document that the drainage management measures are effective at mitigating past, present, and future drainage impacts resulting from irrigation within the region.

Key Management Practices Continued

Westlands Water District Land Retirement Plan

As previously indicated, each area will place different emphasis on each management practice. Westlands Water District plans significant land retirement within their area. At the present time, the general outline of the Westlands Water District land retirement plan is as follows:

- Up to 200,000 acres of drainage-impacted land will be purchased from individual landowners, permanently removing the land from irrigated agricultural production. Title to these lands would be retained by Westlands and/or a nonprofit entity, and put to beneficial uses such as wildlife habitat, dry land farming, or related economic development activities. Westlands would manage the retired lands in ways compatible with continuing agriculture on the remaining farmlands.
- The plan must provide balanced benefits for all affected parties.
- The plan must provide farmers a fair and reasonable price for their land, with values determined as if those lands had drainage services provided.
- The program must be voluntary, involving only willing sellers.
- No harm or loss of water should occur to any other CVP water user.
- Third-party impacts must be identified and addressed.

Land Retirement:

- **Key component of regional plan**
- **Voluntary basis**
- **WWD Retirement Plan**
  - Balanced benefits for all affected
  - No harm to CVP users
  - Third-party impacts addressed

- **Retired land uses:**
  - Regional Drainage Reuse/Treatment Facility
  - Business development
  - Flood management
  - Surface water storage
  - Dry land farming
  - Wildlife corridor
  - Upland habitat

Potential Uses of Retired Land within Westlands

Westlands has begun a preliminary investigation into the potential alternative uses of the retired land, with the objective of administering those lands to achieve broader benefits for the District and region. This land will become available for other uses such as regional drainage reuse projects, commercial and industrial use, flood control, surface water storage where appropriate, and wildlife habitat. Each project will be strategically located to maximize the benefits to the region.

For example, drainage reuse projects will be located to maximize their ability to mitigate past drainage impacts and eliminate future regional impacts from land that remains in production. Each land use choice will be coordinated into an overall program designed to maintain a viable environment and economy. Title to these lands would be retained by Westlands and/or a nonprofit entity.

Key Management Practices Continued

To date, the following potential uses for the land have been considered:

- Regional Drainage Reuse and Treatment / Disposal
- Highway 180 Business Corridor
- Panoche/Silver Creek Detention Basin
- Arroyo Pasajero Flood Control Project
- Surface Water Storage (where appropriate)
- Dry Land Farming, Hunting Opportunities
- Wildlife Corridor
- Upland Habitat Development

Regional Drainage Reuse and Treatment

Westlands anticipates that lands adjacent to the retired area will still need drainage service with a focus on treatment and reuse. Retired lands can be used as regional reuse projects to provide drainage for lands remaining in production and to mitigate for past drainage impacts. The facilities would be designed and operated similar to the project identified in the USBR's Plan Formulation Report of the San Luis Drainage. The beneficiaries of this project would include: Westlands, landowners who need drainage service, and the USBR since it will be relieved from providing drainage service at a significant cost to the US.

Highway 180 Business Corridor

This project allows land along the proposed Highway 180 alignment to be used for commercial and industrial activities. Land could be made available to local communities impacted by land retirement and land fallowed as a result of decreased water supplies resulting from the implementation of CVP Improvement Act. Beneficiaries from this project would include the City of Mendota, County of Fresno, and Westlands.

Panoche/Silver Creek Detention Basin

This project consists of constructing a detention basin to collect and attenuate flood flows from Panoche/Silver Creek and discharge a constant flow to the Fresno Slough. Historically, flows from Panoche Silver Creek have flowed out from the channel and down to the City of Mendota flooding parts of the city, depositing silt on county and state roadways, and damaging adjacent crop land. Westlands expects this activity will also be administered by the Panoche Silver Creek Coordinated Resource Management and Planning Program. The beneficiaries would include the City of Mendota, County of Fresno, CALTRANS, landowners, and the U.S. Army Corps of Engineers.

Key Management Practices Continued

Arroyo Pasajero Flood Control Project

Retired lands could be used to construct a detention basin to collect and attenuate flood flows from the Arroyo Pasajero. The Corp of Engineers completed a report to construct a 50,000 acre-foot reservoir to attenuate the flows from the creek; however, the cost-benefit ratio did not support construction of the project. As an alternative, DWR is investigating a proposal to divert Arroyo Pasajero flows into the California Aqueduct, transport them downstream, and then divert the waters into the Tulare Lake Bed. As an alternative, which is less expensive and easier to implement, Westlands is proposing to divert the Arroyo Pasajero flows onto land retired in the District. The beneficiaries of this project would be the City of Huron, County of Fresno, CALTRANS, U.S. Army Corps of Engineers, California Department of Water Resources, State Water Contractors, and the CVP contractors.

Surface Water Storage

The project consists of constructing a series of storage basins on eight sections (5,120 acres) adjacent to Westlands Laterals 6 and 7 within Township 15 South and Range 15 East. The Project will have an estimated 40,000 to 50,000 acre-feet of storage for rescheduled water, surplus water, and water from other sources including refuges, San Joaquin River flood flows, and other CVP contractors. In addition to the storage benefit, the project will be near the Mendota Wildlife Area and will provide habitat for migratory birds, and with this benefit, other partners could be willing to contribute to the project. This project will be designed to prevent impacts to shallow ground-water due to seepage.

Dry Land Farming, Hunting Opportunities

Currently, Westlands is leasing out land acquired by the District for lessees to farm. Since these lands do not have a CVP allocation, dry land farming is the best alternative. Typically, lessees will plant a winter or spring grain on the land, which will be harvested or used for livestock grazing. Retired lands can be dry land farmed with grains and other crops to provide food and habitat for wildlife. Beneficiaries include Westlands, wildlife, and the local economy.

Key Management Practices Continued

Wildlife Corridor

Westlands has been meeting with the USBR, California Department of Fish and Game, and U.S. Fish and Wildlife Service to discuss restoring acquired and retired land for wildlife purposes. Both wildlife agencies are interested in restoring an east-west and north-south corridor to allow species to migrate to different lands and different areas of the District.

In addition to using dedicated retired lands for a wildlife corridor, Westlands would also work with landowners with permanent crops, which could also be used for a corridor. Beneficiaries of this project include the California Department of Fish and Game, U.S. Fish and Wildlife Service, and Valley species.

Upland Habitat Development

Similar to the Wildlife Corridor Project, Westlands has been meeting with the USBR, California Department of Fish and Game, and U.S. Fish and Wildlife Service to discuss restoring acquired and retired land for upland habitat purposes. Retired lands can be restored to upland habitat similar to the USBR demonstration project for animal and plant species. Beneficiaries include the USBR, the California Department of Fish and Game, U.S. Fish and Wildlife Service, and Valley species.

Photo Credit:
Gary Zahm, USFWS

Groundwater Management

Groundwater management will be used to meet several goals of the drainage management program. These goals include: 1) limiting the advance of sub-surface drainage; 2) maintaining groundwater below the crop root levels; 3) mitigating the impacts from the lack of historical drainage service; 4) providing necessary interim drainage management until disposal options are developed; and 5) developing an additional water supply for beneficial uses, such as Level 2 refuge supplies during the life of the project.

Studies conducted by the Federal government and others have identified that groundwater management is a suitable strategy to provide drainage within the region. The studies conclude that extraction of groundwater above the Corcoran Clay will lower groundwater levels and reduce drainage water production. Also using a groundwater flow model, specifically designed for the region (Belitz) the U.S. Geological Survey estimated the beneficial effects from pumping on levels and flows.

Key Management Practices Continued

The Belitz model demonstrates significant drain water source reduction benefits from groundwater pumping. Figure 1 (see page 21) presents the modeled estimations of drainage discharge reduction from the Exchange Contractors sub-area. The modeling indicates that groundwater management is a key component of any drainage program.

Groundwater pumping also is needed to manage the advance of poor quality groundwater northeasterly towards the City of Firebaugh and the San Joaquin River. The San Joaquin River Exchange Contractors Water Authority AB3030 groundwater monitoring effort has documented this advance and concluded that groundwater pumping is needed to manage the advance.

In addition, groundwater pumping is needed in order to extract the accumulated drainage water from the shallow groundwater. The accumulation is from the many years of irrigation of crop lands without the ability to drain. The resulting imbalance in the water budget within the region has caused the shallow water table to rise. Surface water has been applied at rates that exceed the carrying capacity of the groundwater system resulting in increase groundwater storage in shallow zones. A groundwater pumping program would be designed to extract the accumulation to pre-CVP levels.

The Groundwater Management Plan will develop a usable water supply during the life of the project. It has been shown that water from well below the root zone and above the Corcoran Clay, while generally high in salinity, does not contain selenium. This selenium-free water can be used to augment water supplies for regional re-use projects, wildlife habitat and traditional farming without creating potential problems associated with selenium-laden water.

A Groundwater Management Program is currently in the early stages of deployment through a set of studies and pilot projects focused on immediate drainage relief. Program progress is managed through a monitoring analysis and refinement system designed to maximize benefits and direct project component development. It is expected that the program will include the following steps:

1. Identify the acceptable water quality standards for the various water supply needs in the area. As an example, the Grassland Drainage Area (GDA) 4,000-acre experimental salt removal project has an additional need for water supply in the 2,500 parts per million (ppm) total dissolved solids (tds) range. Additionally, an investigation is being conducted to determine whether a portion of the well water could be blended with better quality Delta-Mendota Canal water and used within the Grassland Water District. On the basis of the required standards, identify potential production areas with acceptable groundwater quality through evaluation of existing data, pilot project data, and additional samples to be collected for this purpose. The results will provide preliminary groundwater volumes and production area estimates for the future pumping strategy.

2. Modify, update and develop analytical tools. The U.S. Geological Survey groundwater-flow model is the primary tool to analyze the proposed pumping strategy. Necessary updates include: a) extension of model boundaries to include all of the area; b) reevaluation of boundary conditions for potential impacts on the pumping assessment and modification as necessary; c) representation of drainage systems in greater detail; d) revise model time-steps to provide seasonal information, review and revise hydraulic conductivity data; and e) revise sub-area boundaries. Portions of these work tasks are currently being accomplished and are in various stages of completion.

3. Utilize analytical tools to identify preferred production areas and develop a preliminary pumping strategy. The groundwater-flow model and an optimization program will be used to estimate the mixture of pumping volumes to optimize water quality. The groundwater-flow model will be utilized to determine pumping amounts and locations to minimize drainage water production, possible subsidence effects, and maximize management of poor groundwater migration. Solute transport modeling updated using recent pilot project data will be used to calculate the expected operation life of the pumping strategy.

Key Management Practices Continued

4. Design and implementation of further field-scale pilot projects to evaluate the pumping in areas most likely to result in successful drainage and/or water level reductions and yield good quality water. Collect water level, drainage and pumping data. Measurement of pumping volumes will be critical for effective evaluation of the project. Implementation of initial field-scale pilot projects is currently under way with results from the monitoring indicating good results towards successful drainage management.

5. Incorporate pilot projects results into the model and reevaluate pumping using the new information. Integrate pumping into the overall drainage management strategy.

6. Conduct necessary environmental and additional legal analysis.

7. Fully integrate pumping into the overall drainage management strategy; install necessary wells and integrate these existing wells into the water supply system.

Groundwater Management:

- **Develop new water supply**
- **Maintain groundwater below crop root zone**
- **Mitigate lack of drainage service**
- **Necessary interim management**
- **Limit advance of subsurface drainage**

Source Control

Source control is the first line of defense in the battle to control subsurface drainage. Farmers in the region have implemented various irrigation improvements by taking advantage of funding through the State Revolving Fund (SRF) and other sources to improve irrigation practices. These practices include conversion to ¼-mile furrows, sprinkler systems and drip irrigation systems. Experimentation has also proceeded with timing of pre-irrigation and shallow drainage management to reduce deep percolation. These practices and new improvements will continue to be implemented to further reduce the production of subsurface drainage water that has to be managed by other means. It is assumed funding will be utilized through various sources including SRF loans or other loan/grant sources.

Photo Credit: Central California Irrigation District

In addition to on-farm measures, such as improved irrigation practices, there are regional source control measures that likely would be implemented on a regional level by districts or other regional entities. These would include lining of surface water delivery canals to reduce seepage losses that contribute to subsurface drainage and implementation of uses of drainage water for displacement projects, such as replacing fresh water dust control with permanent systems or water trucks using drainage water.

Source Control (drainage volume reduction):

- **Reduce drainage volume through improved irrigation on-farm**
- **Regional efforts to reduce drainage:**
- **Reduce seepage loss in canals**
- **Use drainage water for dust management**

Key Management Practices Continued

Regional Drainage Reuse

Reuse is the application of subsurface drainage water (either directly or slightly diluted) to salt tolerant crops. The purpose is to reduce the volume of the subsurface drainage water for ease in treatment.

Reuse is different from recycling in that recycled water is minimized for maximum yield on salt sensitive crops. Reuse is maximized for drainage quantity reduction. Crops used for reuse would include salt tolerant alfalfa, pasture or halophytes.

These crops would not necessarily be grown for returns on yield but for drainage volume reduction. Lands used for reuse would have to be managed to maintain adequate salt levels in the fields for the crops grown. This would likely entail installing of subsurface drains under the reuse fields so an adequate leaching fraction can be maintained. It is assumed that approximately 4 acre-feet per acre could be applied on the reuse crops with leaching fraction of about 27% or 1 acre-foot per acre. So there is a 73% reduction in volume through the reuse projects. The reuse projects are essential to any long-term drainage plan.

These projects will be modeled after the San Joaquin River Water Quality Improvement Project (SJRIP) that has already been partially implemented within the Grassland Drainage Area. Within Westlands Water District, portions of the land purchased under the land retirement program that are best suited to mitigate past and future drainage impacts will be used to implement these regional reuse projects. The land will be used to grow salt tolerant crops as a means to utilize water collected by shallow agricultural tile sumps as well as water generated by shallow well pumping described above in the groundwater management section. These projects will reuse drainage water in order to reduce the volume of and increase the efficiency of treatment. These types of projects have been proven effective and will be integrated into the entire regional approach to maximize drainage water use and minimize drainage impacts.

Specific locations will be selected to implement large-scale reuse projects to mitigate regional drainage impacts. These sites will be selected based upon the ease of delivering drainage flows to the area, the regional benefits from intercepting drainage flows on the property, and the availability of the property. Preliminary investigations indicate that, in addition to retired lands within Westlands, portions of Broadview Water District and areas on the northern edge of the Grassland Drainage Area are potential candidates for regional reuse projects.

These projects will reuse drainage water in order to minimize flows for more efficient treatment. Drainage water will be applied to salt tolerant crops such as pasture and alfalfa. These crops will be marketed when possible to reduce costs of the project. While the crops will be marketed the primary factor in planting decisions will be drainage reduction not crop production. The agricultural activity will also provide jobs in the region and help maintain retired ground to avoid impacts to surrounding farmland. Subsurface tile lines will be installed on the reuse projects to collect water that percolates from the irrigation. This water will be reused, treated or placed in evaporation ponds.

Regional Drainage Reuse:

- **Reuse subsurface water on salt-tolerant crops**
- **Maximized for drainage volume reduction**
- **Crops grown mostly for drainage, not commercial purposes**

Key Management Practices Continued

Drainage Water Treatment

Drainage water treatment is another essential component of a regional drainage solution. Drainage water collected from the regional drainage projects described above will require treatment to further reduce its volume, remove salt and allow for more cost-effective disposal of the residue.

This treatment will consist of reverse osmosis and other membrane systems, chemical reduction systems as well as flow-through wetland systems. Pilot projects exist for all of these treatment systems. The region will expand these pilot programs to find the most effective system to treat the drainage water.

It is anticipated that irrigation efficiency, source control, groundwater management and regional reuse projects can reduce the amount of drainage water by 82%. However, to eliminate discharge to the San Joaquin River the remaining water needs to be managed. Pilot treatment plants are being implemented within the Grassland Drainage Area. These investigations include membrane treatment for removal of salt, selenium, and boron as well as flow-through selenium removal systems. The membrane systems for pretreatment and salt removal are showing water recovery of up to 92% and salt removal of up to 98%. The system also is showing promise on accomplishing this with reduced power requirements. These pilot projects will continue for the next five years. Selenium treatment systems are showing a high percentage of selenium removal. Investigations are continuing on the removal of selenium through cropping in reuse areas.

The products of these treatment systems will be improved quality water and concentrated brine. The water will be made available to augment regional water supplies. Some of this water may be of such high quality to be used for municipal and industrial supplies. This water will be marketed to help offset the costs of the treatment process. After treatment the resulting brine solution must be disposed of or utilized.

Drainage Water Treatment:

- **Treatment to reduce volume, remove salts, allow for cost-effective disposal.**
- **Reverse Osmosis, membrane systems**
- **Pretreatment and salt removal shows water recovery at 92%; salt removal at 98%**

Salt Disposal

Salt disposal is the final stage of the drainage solution. Initially, the brine solution could be stored in waste containment facilities, including evaporation ponds, built on retired land. Ultimately, it may be possible to market some of this product for uses ranging from construction materials to dying textiles. An aggressive investigation into potential markets for reclaimed salts should be implemented. If successful, this investigation could result in the most economical and environmentally favored alternative for salt disposal. If a viable market for reclaimed salt is not developed then, as an alternative, salts could be collected in waste containment facilities and stored indefinitely. Evaporation ponds and solar evaporators will be used to concentrate the

Key Management Practices Continued

brine into sludge or dry crystals for ultimate utilization and disposal. Final disposal also could be into permitted disposal sites. Recent legislation has acknowledged the need for on-site disposal of salt.

While the need for ultimate salt disposal is obvious, the best method for this disposal is unclear. Any final salt disposal option must be economically viable and environmentally sound. In an effort to find the best disposal option, the parties will explore a wide variety of disposal methods. The ultimate disposal option will be selected based upon economic, environmental and practical considerations. Determination of the best disposal method will require significant efforts by all parties, but these efforts will result in a comprehensive drainage program.

Salt Disposal:

- **Preferred alternative in current analysis**
- **Final stage of drainage solution**
- **Possible market for salt products**
- **Permitted disposal sites**

Adaptive Management Approach

This Plan will utilize adaptive management to find the most effective and efficient drainage solutions. Districts in the region will coordinate their activities with input from USBR. Each of the districts will participate in a group to manage the regional activities and document the program's progress. The members will work with the USBR, and other State and Federal agencies to ensure the most effective program possible. This Plan establishes a three-phased approach to establishing drainage service. The phased approach will allow the districts to modify their activities according to the most recent developments in drainage control.

The group will analyze specific management efforts and refine them as needed to meet the goal of sustaining agriculture while addressing regulatory issues. When particular practices are shown to be viable they will be expanded. When the analysis indicates that other practices are deficient they will be refined or abandoned. This process will serve as a practical test of the drainage reduction concepts developed over the last several decades.

Each of the districts supporting this approach has specific resources and expertise that can be used to find long-term in-Valley solutions. If after the region has made a focused effort to reduce drainage impacts through in-Valley solutions and these practices do not prove to be the total drainage solution, then an out-of-Valley solution can be more thoroughly explored. The projects, expertise and knowledge the region develops through this process will greatly benefit regional drainage control in both the short- and long-term.

Adaptive Management Approach:

- **To find and perfect most effective and efficient solutions**
- **Local district coordinate with USBR**
- **Three-phased approach allows for modifications and flexibility**
- **Reacts to changes and advancements made in drainage management**

Phase I Drainage Plan from 2003 to 2009

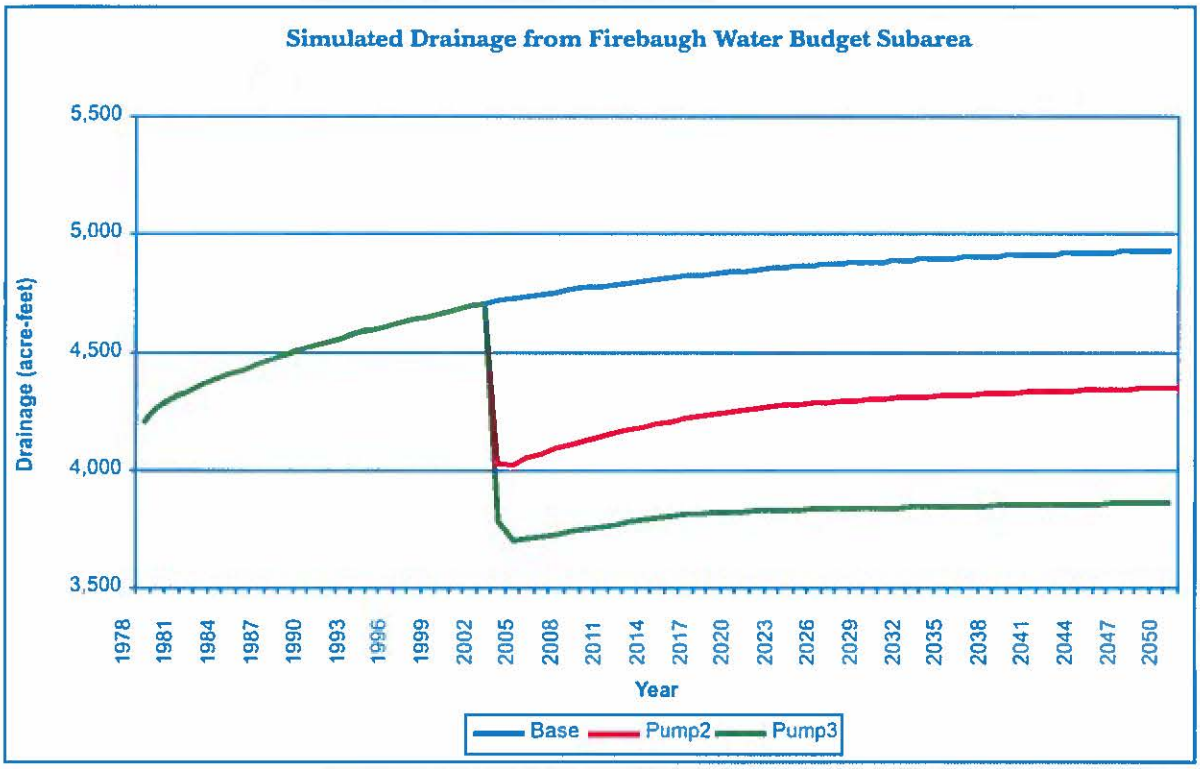
The region will implement the drainage management projects, which are generally located on Exhibit C.

Figure 2 presents the proposed timeline and cost estimates for implementation for Phase 1.

All Sub-areas

- Adaptive management of SJRIP and Groundwater Management Programs.
- Expand and develop reuse areas.
- Continue implementation of proven treatment programs,
- Implement other viable land use options evaluated in Phase I,
- Finalize in-Valley treatment and disposal, or select and implement other disposal alternative,
- Implement salt disposal program,
- Evaluate success of the Drainage Management Program,

Figure 1



Base Continue existing conditions.
Pump 2 Retire , 25,000 AF/yr pumpage from beneath Firebaugh Subarea (95% above corcoran).
Pump 3 Retire , 50,000 AF/yr pumpage from beneath Firebaugh, Broadview, Panoche, and WWD.

Firebaugh subarea includes CCID and FCWD.

Phase II
Drainage Plan

Figure 2

Westside Regional Drainage Plan
Project Funding and Implementation for Phase I

Year	Item	Estimated Cost	Sub-Area	Comment
2003	Land Retirement Monitoring	$200,000	3	Calfed & Local
	Groundwater Management	$900,000	1,2,3	5 wells Total - 4500af Water Supply & Calfed
	SJRIP Phase 1 Completion	$2,000,000	1,2	SJRIP, USBR Plan, Prop 50, Prop13 and Local
		$3,100,000		
2004	Land Retirement	$100,000,000	3,4,5	"Up to" amount based on Implementation
	Groundwater Management	$600,000	1,2,3	8 Wells Total - 6500 af Water Supply & Calfed
	GW Conveyance Legal & Engineering	$3,000,000	1,2,3	Long Term Water Supply
	SJRIP Phase 1 Completion	$3,000,000	1,2	SJRIP, USBR Plan, Prop 50, Prop13 and Local
	Treatment Legal & Engineering	$2,000,000	1,2,3	USBR Plan
		$108,600,000		
2005	Land Retirement	$100,000,000	3	"Up to" amount based on Implementation
	Groundwater Management	700,000	1,2,3	11 Wells Total - 9500af Water Supply
	GW Conveyance Construction	$10,000,000	1,2,3	Long Term Water Supply
	SJRIP Plumbing	$950,000	1,2	SJRIP & USBR Plan
	SJRIP Phase 2 Expansion	$8,100,000	1,2	SJRIP & USBR Plan
	SJRIP Phase 2 Development	$2,300,000	1,2	SJRIP & USBR Plan
	Treatment Legal & Engineering	$2,000,000	1,2,3	SJRIP & USBR Plan
		$124,050,000		
2006	Land Retirement	$100,000,000	3,4,5	"Up to" amount based on Implementation
	Groundwater Management	$800,000	1,2,3	14 Total Wells - 12500af Water Supply
	GW Conveyance Construction	$10,000,000	1,2,3	Long Term Water Supply
	SJRIP Phase 2 Development	$5,000,000	1,2	SJRIP & USBR Plan
	SJRIP Phase 3 Expansion	$5,000,000	1,2	SJRIP & USBR Plan
	Treatment Legal & Engineering	$4,000,000	1,2,3	SJRIP & USBR Plan
		$124,800,000		
2007	Land Retirement	$100,000,000	3,4,5	"Up to" amount based on Implementation
	Groundwater Management	$850,000	1,2,3	17 Total Wells - 15500af Water Supply
	SJRIP Phase 3 Expansion	$7,100,000	1,2	SJRIP & USBR Plan
	SJRIP Phase 3 Development	$7,300,000	1,2	SJRIP & USBR Plan
	Treatment Construction	$21,000,000	1,2	SJRIP & USBR Plan
		$136,250,000		
2008	Land Retirement	$100,000,000	3,4,5	"Up to" amount based on Implementation
	Groundwater Management	$1,000,000	1,2,3	20 Total Wells - 19500af Water Supply
	Treatment Construction	$21,000,000	1,2	USBR Plan
		$122,000,000		

NOTE: The Land Retirement includes development of the key management practices such as regional reuse and treatment, dry land farming, etc.

Sub Area
1 San Luis Unit Sub-Area
2 Exchange Contractors Sub-Area
3 Northern Westlands Sub-Area
4 Central Westlands Sub-Area
5 Southern Westlands Sub-Area

Bibliography / References
Westside Drainage Plan

- Central Valley Basin, A Compressive Department Report on the Development of the Water and Related Resources of the Central Valley Basin, and Comments from the State of California and Federal Agencies – U. S. Department of the Interior Bureau of Reclamation – August 1949

- San Luis Unit – Central Valley Project – California – Special Report on Drainage and Water Service Draft Supplement to Final Environmental Statement – USBR – September 1984

- Central Valley Project Water Development – Raymond W. Gaines - 1986

- Detailed Options Descriptions – San Luis Unit Drainage Program, U.S. Department of the Interior, Bureau of Reclamation Mid-Pacific Region – Prepared by Davids Engineering – August 17, 1990

- Plan Formulation Appendix – San Luis Unit Drainage Program – Prepared for U.S. Department of the Interior, Bureau of Reclamation Mid-Pacific Region – Prepared by CH2MHILL Sacramento, California in association with U.S. Department of the Interior, Bureau of Reclamation Denver office – December 1991

- Westlands Sub-area Report – Prepared for the San Joaquin Valley Drainage Implementation Program – Westlands Water District – October 1998

- Task 1 – Drainage Reuse – Final Report February 1999 – Drainage Reuse Technical Committee – The San Joaquin Valley Drainage Implementation Program and The University of California Salinity/Drainage Program

- Task 3 – Land Retirement – Final Report February 1999 – Land Retirement Technical Committee – The San Joaquin Valley Drainage Implementation Program and The University of California Salinity/Drainage Program

- Task 5 – Source Reduction – Final Report February 1999 – Source Reduction Technical Committee – The San Joaquin Valley Drainage Implementation Program and The University of California Salinity/Drainage Program

- Task 6 – Groundwater Management – Final Report – April 1999 – Groundwater Management Technical Committee – The San Joaquin Valley Drainage Implementation Program and The University of California Salinity/Drainage Program

- Final Report – Evaluation of the 1990 Drainage Management Plan For the Westside San Joaquin Valley, California – Submitted to the Management Group of the San Joaquin Valley Drainage Implementation Program – January 2000 – Prepared by SJVDIP and The University of California Ad Hoc Coordination Committee

- The San Joaquin Valley Implementation Program reports can be found at the following web site: http://wwwdpla.water.ca.gov/agriculture/drainage/implementation/hq/sjvlib.htm

- Grassland Bypass Project, Final EIS/EIR, prepared by URS for the USBR and San Luis & Delta Mendota Water Authority, May 25, 2001

- The Rainbow Report - A Management Plan for Agricultural Subsurface Drainage And Related Problems on the Westside San Joaquin Valley, September, 1990

- San Luis Drainage Feature Re-Evaluation Plan Formulation Report. Prepared by the U. S. Department of the Interior Bureau of Reclamation, Sacramento California, December 2002

APPENDIX E

Firebaugh Canal Water District Water Conservation Loan Program

FIREBAUGH CANAL WATER DISTRICT
GUIDELINES FOR WATER CONSERVATION LOAN PROGRAM

1. All projects must be for the benefit of Landowners in the Firebaugh Canal Water District (FCWD) service area. However, FCWD will assist landowners in coordinating with adjoining districts to accomplish mutually beneficial projects. As further assistance, FCWD's staff will compile and maintain a list of additional funding sources available for projects.

2. Qualifying projects:
   a. Proposed projects involving concrete-lined ditches, tail water return systems, and land leveling, underground pipe-lines and drip irrigation systems will be reviewed by the FCWD staff or a qualified engineering firm to grant preliminary approval. Qualifying projects will not include the installation of deep wells.
   b. Final approval will be in the sole discretion of the FCWD Board of Directors.
   c. A project will not be funded if project has not been approved by the FCWD Board of Directors.

3. The factors considered in order to determine project funding and / or funding priority include but are not limited to:
   a. Quantity and cost per acre-foot of water conserved;
   b. Reduction in soil erosion;
   c. Reduction in suspended solids in irrigation facilities and drains;
   d. Reduction of impacts of drainage discharges; and
   e. Benefits to drainage impacted areas which reduce quantities or improved quality of drainage discharged.
   f. Overall water conservation.

4. The District will allow a Landowner to submit a request for the repair or upgrade of an existing project once the project is five-years or older and has no outstanding debt with the District. Funding for the repair or upgrade of existing projects will be reviewed after all requests for new projects have been completed and funded. The terms of a repair or upgrade of an existing project will be the same as a new project and at the sole discretion of the District's Board of Directors.

5. As part of the application process, the Landowner must meet with FCWD staff to analyze the applicant's conservation project. This shall be completed and reviewed by the FCWD Board of Directors before any funds can be committed to a project.

6. No work is to be undertaken until the project is approved, and a pre-construction meeting is held identifying applicable Natural Resource Conservation Service construction standards to be utilized. Work to commence within three months of approval. The project must be completed within 12 months of project approval.

7. The maximum to be loaned is $1,000.00 per acre benefited by the project. Final amount of the loan is within the sole discretion of FCWD.

8. The term of the loan will be for 5 years, except under the following conditions, where the term may be extended up to ten years:
   a. The project involves the lining or under grounding of a community lateral.

9. The loan will be evidenced by a promissory note and will be secured by a recorded lien against the county- assessed parcel or parcels benefited by the project and/or on which the improvements are installed or located. All landowners holding title to the land benefited will be required to sign the repayment agreement and security documents. If the loan is used to acquire approved equipment, fixtures, or other movable property used on the land, the note will also be secured by a security agreement and financing statement. (UCC 1)

10. On projects where USDA / FSA - EQIP Grants, or additional funding is involved, the districts loan proceeds will be made available after the outside funding is expended.

11. All loans shall be repaid with single annual payments; due on January 1of each year until the loan is repaid in full:
    a. The initial installment will be due on the first January 1 that is more than six months after the loan is issued.
    b. The principal amount of the loan shall be repaid in equal amounts over the term of the loan.
    c. 3% simple interest on the unpaid principal balance of the loan will be included in each year's billing.
    d. **If an annual installment has not been made by December 31, the entire loan balance will become due and payable and will be subject to a 10% penalty, plus 1.5% per month penalty, compounded monthly until repaid in full.**

APPENDIX F

Official Resolution

FIREBAUGH CANAL WATER DISTRICT
RESOLUTION NUMBER - 2019-04

RESOLUTION OF THE BOARD OF DIRECTORS APPROVING AGRICULTURAL WATER USE EFFICIENCY PROGRAM / CALFED GRANT APPLICATION

WHEREAS, the Firebaugh Canal Water District Understands the importance of water conservation in its effort to reduce sub-surface drainage throughout the district; and

WHEREAS, the Firebaugh Canal Water District is desirous of obtaining grant funding to line a portion of its 2nd Lift Canal; and

WHEREAS, the Firebaugh Canal Water District is capable of providing the amount of funding and / or in-kind contributions specified in the funding programs and the Board of Directors has reviewed and supports the grant applications prepared for the WaterSMART Grant Program / CALFED Water Use Efficiency Grant Financial Assistance; and

WHEREAS, if the Firebaugh Canal Water District is selected for funding through the aforementioned funding assistance programs the District will cooperate with the Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

NOW, THEREFORE, BE IT RESOLVED, that the Firebaugh Canal Water District's General Manager is hereby authorized to submit and administer this grant application through the Bureau of Reclamations Agricultural Water Use Efficiency Grant Program.

All the foregoing being on motion of Director McCurdy and seconded by Director Smith and authorized by the following vote, to wit:

AYES: Stearns, Smith, McCurdy, Hurd, Villere

NOES: None

ABSENT: None

ABSTAINED: None

I Hereby Certify that the foregoing resolution is the resolution of said District as duly passed and adopted by said Board of Directors on the 17th day of September, 2019.

WITNESS my hand and seal of said Board of Directors this 17th day of September, 2019.

Mike Stearns

MIKE STEARNS, President
Firebaugh Canal Water District

ATTEST:

JEFF BRYANT, Secretary
Firebaugh Canal Water District

* * * * *

I hereby certify that the foregoing is a true and correct copy of a resolution duly adopted by Firebaugh Canal Water District, a local public agency organized under Appendix 8 of the California Water Code, at a regular meeting of the Board of Directors thereof duly called and held at the office of the District on the 17th day of September, 2019.

JEFF BRYANT, Secretary
Firebaugh Canal Water District