003- Project

April 11, 2016

WaterSMART: Drought Resiliency Project
Grants FY 2016
Funding Opportunity No. R16-FOA-DO-006

Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2

Semitropic Water Storage District,
Northwestern Kern County of the Southern San Joaquin Valley, CA

Applicant:
Semitropic Water
Storage District
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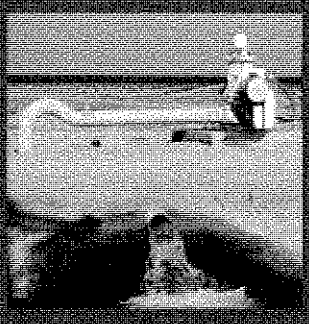

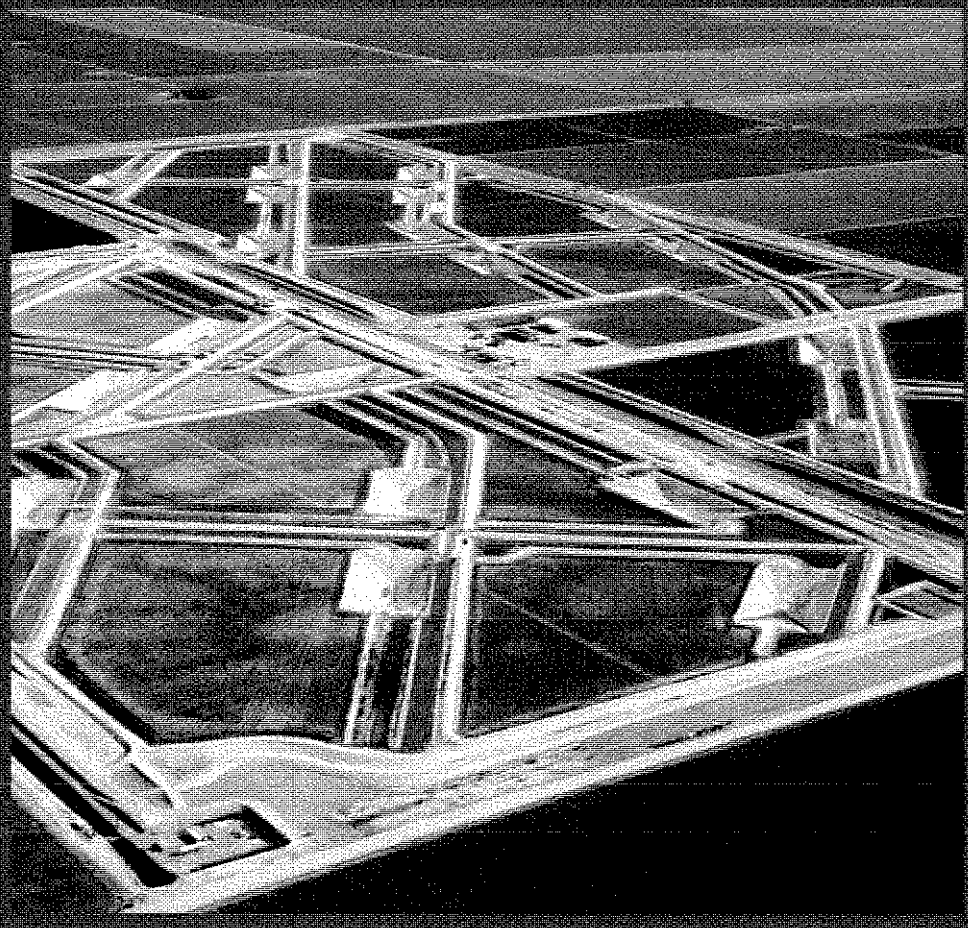

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Semitropic Water Storage District

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Project Location

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Semitropic Water Storage District

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April 11, 2016

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3.1 Executive Summary

Date	April 11, 2016
Project Name	Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2

Applicant Information	
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Note: all figures are contained in Appendix A, unless noted.

The Semitropic Water Storage District (Semitropic, District) proposes a cost-shared project with the U.S. Bureau of Reclamation (Reclamation, USBR). The *Groundwater Well Extraction Improvement for Return of Stored Water Project, Phase 2* (Project) proposes drought resiliency for in-District and external users by equipping seven existing District-owned recovery wells with pumps, motors, discharge piping, and electrical equipment. External users refers to "third-party" districts (and landowners) that participate in the Semitropic Groundwater Storage Banking Program (Banking Program). The Banking Program allows these districts, known as "Banking Partners," to store or "bank" water in the District's facilities through groundwater recharge during wet years and subsequent return of supply during dry years or drought conditions. The Banking Partners consist of water users outside of the Semitropic district boundary. In terms of drought resiliency, this Project provides to Semitropic the means of more effectively extracting banked water supplies for both in-district and "third-party" needs, through greater pumping capacity. Total Project costs equate to $716,499. Of this total, $300,000 is requested Federal funding.

The Project is estimated to provide the following annual benefits, in acre-feet.

Avg. Annual District Water Supply	378,879 AF
Est. Annual Water Saved[1]	11,200 AF
Est. Annual Water Better Managed[2]	11,200 AF

[1] Saved, in this context, indicates the volume of water better managed that allows for improved wet year storage (i.e., recovered volume from aquifer that can be refilled during wet years).

[2] Indicated for both in-District uses and in support of the Banking Program.

3.1.1 Project Duration and Completion Date

The Project is to be completed within one year of signing a grant agreement. Construction activities are expected to be performed within four months and all Project activities are expected to be completed by June 2017. Time allotted for project activities are based on recent experience by District staff in completing the initial phase and the design for this work.

3.1.2 Project Relation to Federal Facilities

The Project will contribute to the temporary holdover of water supplies (i.e., banking recharge and return) in a basin within Reclamation's Central Valley Project (CVP) Place of Use. The specific Project location (i.e., well locations) is not located on any Federal right of way.

3.2 Background Data

3.2.1 Geographic Location

The location of the District is shown in Figure 1, in the north-central portion of Kern County in the Southern San Joaquin Valley of California. The District actively supplies a service area of approximately 221,400 acres, with approximately 136,000 acres as irrigated lands (approx. 61 percent of the District). The District lies between Interstate 5 to the west, State Highway 99 and the City of Wasco to the east, the City of Shafter to the southeast and the small community of Buttonwillow to the southwest. At its greatest extent, the District's service area is approximately 19 miles wide (east-west) and 27 miles long (north-south).

The locations of the existing seven wells for the equipping of pumps and infrastructure proposed in this Project are shown in Figure 2. These wells are part of the Pond-Poso Spreading and Recovery Facility (Facility), used for the direct recharge of surface water supplies into the underlying aquifer under the Facility.

3.2.2 Primary Water Supplies and Sources

The District was established as a public entity in 1958 and began importing surface water in 1973. The primary source of surface water is State Water Project (SWP) water delivered through the California Aqueduct and dedicated intake canals using infrastructure described in the following sub-section. Besides SWP supplies, the District supplements deliveries with water originating from other surface water sources as available, including Poso Creek, Kern River, and CVP via the Friant-Kern Canal.

A significant portion of the District overlies a usable groundwater basin; in particular the Kern County Subbasin of the Tulare Lake Basin, with an estimated 40 million acre-feet total capacity (DWR, 2004). Landowners in the District utilize pumped wells to extract underlying groundwater resources to meet on-farm water demands when surface water supplies are inadequate. The District measures and records groundwater pumping from district-owned wells; however, pumping from privately-owned wells is not reported to the District unless the water is pumped into the District's system for conveyance and delivery to other locations (i.e., "wheeled" water supplies) or in support of the Banking Program. The following table categorizes these varied sources by applicable contractual allocations and average annual deliveries from 2011 to 2015:

Water Supply	Annual Contracted Allocation (AF)	Avg. Annual Deliveries (AF)
State Water Project (SWP)	155,000[1]	68,477[2]
Central Valley Project (CVP)	0[3]	0
Kern River	0[4]	0
Poso Creek[5]		< 1,200
Other Water Deliveries[6]		3,564
Groundwater Resources[7]	Not applicable.	306,838
Total[8]	155,000	378,879

[1] Imported SWP water under contract with KCWA, signed in 1973.
[2] Includes all water supplies from the SWP, including principle (Table A) contracted allocation, annual carryover, and other water-purchase programs.
[3] The District is not a long-term CVP contractor with the USBR, however, is capable of receiving diversions of "Section 215" water (i.e., un-storable and unmanaged flows of short duration) as they are made available.
[4] The District is not a contractor for Kern River water supplies, however, occasionally receives diversions courtesy of the KCWA.
[5] Agreement between the District, the North Kern Water Storage District, and the Cawelo Water District for Poso Creek flow, as measured at the State Highway 65 streamflow gaging station for times where water is available.
[6] Includes the following: 1) Reclamation water purchased from Buena Vista WSD at intersection of Main Drain Canal and Intake Canal; 2) Buena Vista East Canal deliveries; and 3) water deliveries through interconnections with neighboring districts, including SWID and NKWSD.
[7] Includes *estimates* of on-farm (or private) groundwater pumping necessary to meet water requirements for irrigated lands within District boundary. Value includes water pumped from private wells in support of the Groundwater Banking Program. (SWSD, 2016).
[8] Totals based on District measurements and approximations (SWSD, 2016). Values do not include Kern River or Poso Creek water sources.

The District initiated the study of the Banking Program, leading to the initiation of a long-term water storage project in 1992. "Water Banking" involves the regulation of wet year surface water Supply through available groundwater storage for subsequent recovery during times of water supply deficiencies. Water is placed in storage through either "in-lieu" recharge (i.e., use of surface water in place of groundwater pumping) or "direct" recharge (i.e., surface spreading of water and percolation in basins or ponds) during the *Recharge* phase. Following a period of groundwater *Storage*, the *Recovery* of water supplies "banked" (i.e. stored) in the underlying groundwater during dry years is completed using either District or privately-owned groundwater wells, with pumped water supply for *Return*. The returned water is delivered back to the California Aqueduct from the District's own supply of SWP water by exchange and/or by pumping and conveying from wells. The figure below illustrates the Water Banking Process followed by the District.

The Banking Program is a continuation of the District's efforts to make the best use of the underlying groundwater resources, including available storage capacity. The District has long-term contracts with several Water Banking partners, including both SWP and CVP contractors. Banked water has a positive impact on groundwater levels, by reducing the lift, which reduces the amount of energy for groundwater pumping. To the extent that the District is unable to divert and use all of the water available to it in a very wet year, the District makes use of the Pioneer and Kern Water Bank Projects, two out-of-district water banking projects located on the Kern River fan, noted as Water Bank Exchanges in the table above. The District has based its water distribution system on conjunctive management of its

surface water and groundwater resources to ensure long-term sustainability for water users. In addition, the District coordinates its activities with neighboring districts and continually reviews and modifies its water supply management practices to preserve and enhance the groundwater resources for the benefit of its landowners.

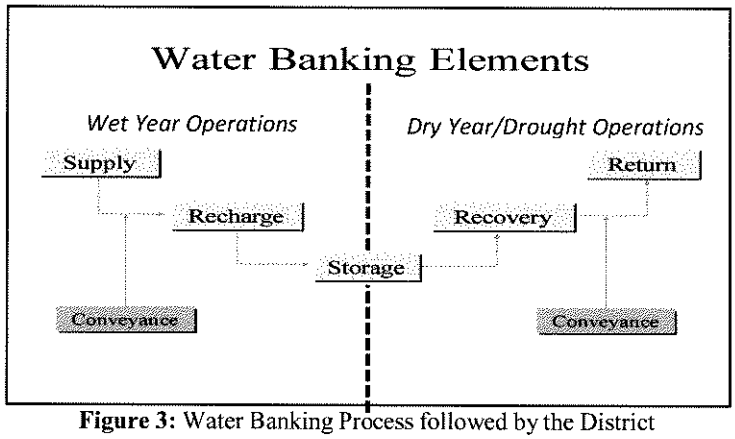


Figure 3: Water Banking Process followed by the District

3.2.3 Water Conveyance and Delivery System

The District's canal and pipeline distribution systems and related works were initially completed in 1973. Additional features and enlargements (e.g., pumping stations, canal check structures, and spreading basins) were constructed and expanded over time with the District's service area, increasing the ability to deliver supplemental surface water supplies to agricultural water users. The current distribution system and service area consists of the following infrastructure:

- California Aqueduct Turnouts
  - Turnout No. 1 (800 cfs capacity).
  - Turnout No. 2 (300 cfs capacity reverse flow capacity to deliver water back to Aqueduct).
  - Turnout No. 3 (640 cfs capacity; reverse flow capacity to deliver water back to Aqueduct; connected to Pond-Poso Canal, 2.5 miles north of Intake Canal).
- Primary Intake Canal (supplied by Turnouts No. 1 and 2).
  - Pond-Poso Canal System (20 miles; north-northeast through District).
  - Buttonwillow Ridge Canal System (10 miles; south-southeast through District).
- Three Spillway Basins used to capture emergency and/or operational spills and return water to distribution system.
- Pump Stations and Discharge Pipelines
  - Junction Pumping Plant (120-inch diameter pipeline en route to Aqueduct; 7 mile pipeline connects Turnout No. 3 to Pond-Poso Canal).
  - Pump-Back Pumping Plant (78-inch diameter pipeline parallel to Intake Canal).
- Irrigation distribution system comprised of 30 miles of lined canals (9 percent of system), 16 miles of unlined canals (5 percent of system), and approximately 270 miles of main and lateral pipelines of various sizes and capacities (86 percent of system).
- Operation and maintenance of about 36 deep groundwater wells. On-farm (private) wells in the service areas total approximately 1,200.
- Recharge Basins: Pond-Poso Spreading Grounds (525 acre recharge facility).

Figure 4 illustrates the District's principle water conveyance facilities. Lands within the District but outside the surface water (primary) service area depend exclusively on pumped groundwater for their irrigation supply. On occasion, typically in wet years, the District is capable of delivering surface water supplies to these areas. The District receives SWP water at the California Aqueduct, with water diverted from direct turnouts (listed above) for District purposes. Water provided to the District for groundwater banking purposes from SWP contractors is also delivered to the District using the same infrastructure. Water returned to the Aqueduct as part of the Banking Program is conveyed through Turnouts No. 2 and 3. Kern River water, when available, is conveyed to the District through the nearby Beardsley and Lerdo canals, under an agreement with the Kern County Water Agency (KCWA) and neighboring districts. Occasionally, there are differences in hydrology between the SWP, Kern River, and CVP's Friant Unit that create opportunities for mutually beneficial exchanges based on the use of intertie infrastructure between districts.

The District relies on the *Storage* and *Recovery* of groundwater for the year-to-year regulation which is required to manage variations in the District's surface water supplies, as well as being the primary mechanism for supporting the Banking Program. The District does not have local access to storage in a large external reservoir (such as nearby Lake Isabella) to regulate seasonal or year-to-year water supplies.

3.2.4 Water Use

The District was formed under Provisions 13 of the California Water Commission (CWC) for the purpose of providing supplemental or partial water supplies for agricultural water uses. The active supply of other water uses by the District is limited, including recreational, municipal and industrial, and environmental. Regarding in-district uses, when surface water supplies which are surplus to immediate irrigation requirements are available, the District will dedicate them for direct groundwater recharge at the Pond-Poso Spreading Ponds (Facilities). In this regard, the District makes use of over 500 acres of direct recharge ponds connected to their conveyance network. In addition, the District will recharge and store water outside of the immediate area through participation in external groundwater banking projects located on the Kern River fan. Annual volumes dedicated to recharge are relatively modest or non-existent in dry years, however, during particularly wet years recharge through the use of the Facilities can be over 18,000 AF/year. Note that the groundwater recharge referenced here does not include supplies as part of the Banking Program.

Regarding agricultural water use, total crop acreage is based on the District's annual crop surveys. Permanent crops, primarily nut trees such as almonds and pistachios, account for around 59 percent of the crops planted in the District. Following these, the most abundant crops in the District, alfalfa and other grains/pasture, account for approximately 43,000 acres (around 32 percent). Using estimate ETc values, agricultural water usage requirements account for approximately 385,500 AF per year in the District (98 percent of total usage) (SWSD, 2016). By comparison, other water uses and outflows, such as groundwater recharge, conveyance seepage and evaporative losses, and limited environmental uses account for an estimated 8,000 AF per year.

Water from on-farm (or private) groundwater wells is pumped either to meet necessary water requirements for irrigated lands, for transfer to other landowner locations across the District (i.e., water 'wheeling'), or for supplies in support of the Groundwater Banking Program. The latest Banking Program figures, calculated from the 2013 Program, estimate that 69,500 AF were pumped from private wells during the five month pump-back period and delivered to the District's conveyance system. This equates to approximately 23 percent of the average annual total 296,986 AF of groundwater use, with the remaining 77 percent used for on-farm purposes. Based on the approximately 190 landowner wells that participated in the 2013 Banking Program, the pump-back rate was approximately 366 AF per well. Around 30 of the participating landowner wells (16 percent) used the District's conveyance system, pumping water for wheeling purposes at an average of 142 AF per well (total 4,260 AF wheeled in District system from participating wells); however, more landowners wheeled water without participating in the Banking Program. The number of wells participating in the annual Banking Programs varies between 100 and 250 individual landowner wells, approximately 8.3 to 20.8 percent of the total number of 1,200 landowner wells within the District.

Future allocations from the State Water Project are anticipated as 62 percent of SWP water supplies, from the SWP Water Supply Reliability Report (DWR, 2015). Shortages in SWP supplies are occurring more frequently and are larger than originally envisioned, mainly due to regulatory restrictions on exports from the Bay-Delta. Based on climate change projections, there will be increased demands for irrigation water which, with reduced surface water deliveries, would be met by an increased reliance on groundwater.

3.2.5 Regional Climate

The District is located at the southern end of the San Joaquin Valley, a portion of the valley that is partially surrounded by a horseshoe-shaped ring of mountains. The Sierra Nevada Mountains to the east shut out most of the cold air that flows southward over the continent in the water. It also catches and accumulates snow, the runoff of which provides water for many of the local surface water sources during the dry summer months.

Summers in the southern portion of the valley are typically hot and dry. Winters are typically cooler and are characterized by frequent fog or low clouds which occur mostly at night. Mean temperatures vary throughout the year from 45°F in January to around 82°F in July, with summers generally in the upper 90s and winters in the low to mid 40s. Most of the precipitation occurs in the winter with little to none occurring during the summer months. Annual precipitation typically ranges between five to seven inches, with most of the rainfall occurring during the "Wet Season" of November through March.

3.2.6 Prior Working Relationships with Reclamation

Various: The District has entered into numerous Warren Act contracts for the wheeling of agricultural water supplies with and between neighboring Federal CVP surface water contractors in Kern and Tulare Counties. The three party agreements facilitating these transfers were signed between the District, the counter-party, and the USBR.

2007: Reclamation completed the first phase of the "Semitropic Stored Water Recovery Unit Special Study Report" and also worked with Reclamation to complete a second phase.

2008: The District, acting as lead agency for the Poso Creek Integrated Regional Water Management (IRWM) Group, was awarded a USBR WaterSMART Grant in fall 2008 to prepare a System Optimization Review. The focus of the SOR was to (1) prioritize the implementation of structural water management measures for the Region based on their expected benefits to the region's water reliability and (2) identify and resolve institutional constraints to exchanges between districts and enhance the use of district groundwater banking facilities that will help mitigate the projected loss of water reliability to the Region.

2009: The District received a "Water for America" challenge grant from Reclamation for the Water Management and Measurement Improvements for Return of Stored Water from the Semitropic Water Storage District Groundwater Bank (Agreement No. R09AP200079).

2009: The District received an ARRA-funded grant through Reclamation (Agreement No. R10AP20R22) for the Pond-Poso Spreading and Recovery Facility; completed December 2010.

2009: The District, as a member of the Semitropic-Rosamond Water Bank Authority, received an ARRA-funded grant through Reclamation (Agreement No. R09AP20R26) for the Antelope Valley Water Bank Initial Recharge and Recovery Facility Improvement Project; completed in 2011.

2010: The District entered into a grant agreement with Reclamation (Agreement No. R10AP20013) for a project entitled groundwater banking improvements in northwestern Kern County. The grant funding was for non-construction improvements to resolve permitting issues for the Stored Water Recovery Unit. The work is complete.

2011: The District entered into a grant agreement with Reclamation (Agreement No. R11AP20112) for the Water Use Efficiency and Energy Improvements for Semitropic WSD and Growers; funded through the WaterSMART Program, Bay-Delta Agricultural Water Conservation and Efficiency Projects. The work is substantially completed including the procurement and installation of a Turbine Generator.

2012: In May 2012, Reclamation approved the Final Environmental Assessment EA-09-121, the Poso Creek IRWM Plan: 25-Year Groundwater Banking, Transfer, and Exchange Program, to enable better conservation and management of the region's decreasing water resources.

2015: In June 2015, the District was notified of a grant award for the Agricultural Water Conservation and Efficiency Grant, administered by both Reclamation and the USDA Natural Resource Conservation Service (NRCS). In September 2015, the District entered into a grant agreement with Reclamation (Agreement No. R13AP00203) for the Groundwater Well Operational Data Acquisition and Solar Power Project, which is for groundwater well operation data acquisition and solar power energy upgrade.

2016: In August 2015, the District was notified of a grant award for the WaterSMART Drought Resiliency Project Grants for the Groundwater Well Extraction Improvements for Return of Stored Water. That project, the initial phase of the current proposed Project, is for the equipping of nine existing recovery wells with pumps, motors, discharge piping, and electrical equipment for completion of the Aquifer Storage and Recovery project.

3.3 Technical Project Description

3.3.1 Project Summary

As mentioned in Section 3.2.2, the District overlies a usable groundwater basin that is conjunctively managed. To that extent, Semitropic utilizes their resources and infrastructure to use surface water supplies towards groundwater recharge. "Indirect" recharge, sometimes referred to as "in-lieu recharge," has been the District's mainstay since the first surface water imports (from the SWP) in the early 1970s. The District's Banking Program is predominately based on in-lieu recharge; however, in 2010, the District added recharge Facilities used for direct groundwater recharge of both excess surface water purchased by the District, and external district and agency water supplies for banking purposes (i.e., storage of wet year supplies for use in dry conditions). During particularly wet years, direct recharge through the use of these spreading ponds is significant in the basin (locations shown in Figure 1).

California's major water conveyance infrastructure is such that water supplies are delivered southward from the Sacramento-San Joaquin River Delta throughout the Central Valley. Therefore, Banking Partners located to the north of the District's service area (e.g., Santa Clara Valley Water District, Zone 7 Water Agency) formalize exchanged supplies for water banking purposes. That is, water belonging to these Banking Partners is conveyed to the District south via the California Aqueduct and is recharged using the Facilities during wet years. During dry years and drought conditions, when these water districts and agencies request their banked supplies, the District participates in a process called "entitlement exchange" where Partners receive Semitropic's water allotment from the SWP. In turn, the District pumps the equivalent quantity of groundwater for in-District purposes and demands. Banking Partners located to the south of the District's service area (e.g., Metropolitan Water District of Southern California, Castaic Lake Water Agency) conversely receive directly recharged water supplies, which are water banked in the aquifer, pumped back to the California Aqueduct using the District's infrastructure and moved south to the specific Banking Partner(s). Both functions require large quantities of recovered banked water to supply Banking Partners' demands during dry years.

This Project proposes to equip seven existing deep wells with the pumps, motors, discharge piping, and electrical equipment necessary to allow groundwater extraction at the Facility. Equipping these wells will increase the return capacity of the District in meeting the dry period needs of the Banking Partners and help with operational flexibility of the recharge Facility, thereby improving water supply management for the District's groundwater banking and management program. Specifically, these improvements apply to the *Recovery* element of the program (as shown in Figure 3), in that stored water supplies are made available for in-District and Banking Partner uses during dry years and drought conditions. The total amount of water expected to be better managed through increased pumping capacity is 67,200 acre-feet over the 30-year life of the project, equal to 2,240 acre-feet annually when normalized over that time period.

From a drought resiliency standpoint, this Project is expected to improve the District's response to dry year and drought conditions by making available stored water that is

returned to Banking Partners or for in-District uses through the increase of District capacity for *Recovery* of stored water. In other words, conditions are improved by having the added pumping capacity for extracting stored water supplies during dry years which becomes needed to meet District and Banking Partners' demands when other surface water supplies are limited.

3.3.2 Tasks and Project Work

Eight tasks are defined below to accomplish the Project work and are organized to parallel Budget and Schedule items. The District has completed design of the infrastructure improvements proposed. Equipment of wells performed by District staff would commence immediately, and the Project would be completed and verified by June 2017.

Task 1: Grant Administration - Activities include coordination of all Project activities, including budget, schedule, communication, and grant and cost-share administration including preparation of invoices and maintenance of financial records. *Deliverables:* Preparation of invoices and other deliverables, as required.

Task 2: Project Reporting - Reports on the Project financial status will be submitted on a semi-annual basis. A Final Project Report prepared upon project completion. *Deliverables:* Submission of semi-annual status reports, significant development reports, and a Final Project Report as specified in the grant agreement.

Task 3: Project Design - The proposed Project will be constructed on property owned by the District. The District has completed all design work for equipping of wells and is ready to install pump and motor units once purchased. *Deliverables:* Design is complete.

Task 4: Environmental Documentation and Regulatory Compliance - An environmental document that meets the requirements of CEQA and NEPA has already been prepared for the Facility. The wells proposed in this application area have been approved by Reclamation as being covered by a 2010 Environmental Assessment. *Deliverables*: Coordinate with Reclamation on compliance of NEPA documentation. Complete and report results of the pre-activity biological survey at the time of construction.

Task 5: Permits and Approvals - The Project is located exclusively within the District's owned and maintained rights-of-way. As such, permitting and approval issues regarding the Project should be minimal. The remaining work under this task will involve consulting with the District and District's Legal Counsel regarding any additional permitting requirements. *Deliverable*: Complete necessary permitting/approval activities prior to construction activities.

Task 6: Equipment Procurement - Equipment procurement for pumps and motors has been completed by the District and remaining work under this task involves the electrical component. *Deliverables*: Finalize component lists for electrical equipment. Issue Purchase Orders. Coordinate delivery of equipment material.

Task 7: Project Construction (Equipping Wells) - The project includes the completion of extraction facilities that would ensure the recovery of (previously stored) water from storage. Work under this task will include: mobilization and site preparation (pre-construction surveys, pre-construction meetings, and equipment delivery), and equipping and plumbing of wells. Equipping of wells will be performed by District staff, along with Chuck

Atkins for welding, who is under contract with the District. *Deliverables:* Reference Construction Administration task below.

Task 8: Construction Administration - This task is simplified in that the District Staff will perform all construction administration. *Deliverables*: Deliverables will include: construction progress pay estimates; documentation and authorization of Change Orders; Responses to Requests for Information (RFIs); Notice of Completion.

3.4 Evaluation Criteria

3.4.1 Evaluation Criterion A – Project Benefits

*Will the project make **additional water supplies** available? If so, what is the estimated quantity of additional supply the project will provide and how was this estimate calculated? What percentage of the total water supply does the additional water supply represent?*

With implementation of the Project, the groundwater *Recovery* capacity of the seven wells would is around 47 acre-feet (AF) per day, based on a pumping estimate of 6.67 AF/day per well (from a conservative estimate of 3.36 cfs per well, average production of wells in District). For an average month (assumed 30-days) the recovery capacity would therefore be approximately 1,400 acre-feet/month (47 AF/day x 30 days/month), or 11,200 acre-feet during a typical 8- month recovery operation (1,400 AF/month x 8 months). The 8 month approximation is based on prior *Recovery* efforts in support of the Banking Program, roughly based on the District's ability to convey water supplies within their infrastructure while supporting normal agricultural demands, typically during the middle of each year (i.e., irrigation and crop growing season). Thus, the wells equipped as part of this Project will be used to return water stored in the aquifer at a rate of approximately 11,200 acre-feet annually during a dry year or drought conditions prompting recovery operations, or about 18% of total annual water supplies (67,200 AF / 378,879 AF).

For the purposes of this application, it is assumed that groundwater recovery operations for conveyance or in-lieu operations with Banking Partners' water are only performed during dry years or drought conditions. Both conditions typically imply reduced surface water deliveries to water districts and agencies, from projects such as the State Water Project (Semitropic's primary surface water source, Section 3.2.2). During hydrologically wet years, and for the most part normal years, when surface water deliveries are higher, the need to return banked water supplies or groundwater usage is lower (SWSD, 2016). Based on typical banking *Recovery* operations and practiced District operation, when surface water allocations are approximately 40% of full (normal) allocation or less, there is an increase in the requests for banked water supply returns (KCWA, 2011). Thus, the 40% or lower values provide a threshold for approximating banking *Recovery* operations. Note that most Banking Partners are also SWP Contractors (e.g., Metropolitan Water District of Southern California, Castaic Lake Water Agency) and base their decisions on the same annual allocation percentage of surface water deliveries as Semitropic.

From the DWR SWP Final Delivery Capability Report 2015 (DWR, 2015), historical annual SWP allocation percentages were analyzed using 2015 condition modeling techniques for the years 1921 through 2003 in order to "project future conditions" using historical data (i.e., allocations from futuristic model results reported for existing condition runs against

historical hydrology). These models also accounted for potential climate change impacts on reduced surface hydrology for the SWP (DWR, 2015; KCWA, 2011), some of which are explained in Section 3.4.2. Based on this analysis, for the 82 year period, the percentage of yearly occurrences below the aforementioned 40% threshold were approximately 19.5%.

Assuming a 30-year life cycle for the pumps, motors, discharge pipelines, and electrical equipment for the five wells installed under this Project, as explained above, this means that approximately 5.8 years would expectedly be under banked water *Recovery* operations (30 years x 19.5%). For the purposes of this application and following analysis, that number is rounded to 6 out of 30 years (assuming some minor potential for normal year operations facilitating transfers and exchanges using banked water supplies). Using the annual recovery volume mentioned above, this means that approximately 67,200 AF of banked water supplies (11,200 acre-feet x 6 years) could potentially be recovered over the 30-year life period. Normalized over 30-years, the result is approximately 2,240 acre-feet annually (67,200 AF / 30 years).

*How will the project build **long-term resilience to drought**? How many years will the project continue to provide benefits?*

The purpose of this Project involves making banked wet year water supplies available during dry years and drought conditions, as explained in Section 3.2.2. The existing wells will be equipped with pumps and motors, allowing for conveyance through District infrastructure to more effectively extract previously stored water supplies for in-District and Banking Partner uses (if delivered to the California Aqueduct). In terms of drought resiliency and in relation to those illustrated elements, implementation of this Project expands the District's *Recovery* capability (i.e., ability to recover water stored underground with more pumping outflow) and *Return* capacity (i.e., ability to move water more water for return purposes from an increased number of pumps). Both elements are performed during dry years and drought conditions, as the District will actively pump the banked groundwater to compliment limited surface water supplies. The following text quantifies the District's ability to increase water supply storage through the *Supply* and *Recharge* elements, following the principle that this Project equips the District with more "pump back capacity" (i.e., groundwater *Recovery*) used to *Return* banked supplies to users, and to make available aquifer capacity for later storage (i.e., allowing for the banking process from Figure 3 to be used again in the same aquifer zones).

The infrastructure has been constructed and managed (e.g., spreading Facility, conveyance canals and pipelines) such that the District's groundwater banking program will remain operational for the foreseeable future. For the purposes of this application, however, the 'life' of the project is estimated as 30-years from pump, control mechanisms, and outlet pipe operational life. This timeframe for life cycle analysis has been used in prior grant applications.

*How will the project improve the **management of water supplies**? For example, will the project increase efficiency or increase operational flexibility? If so, how will the project increase efficiency or operational flexibility?*

Equipping the wells with pumps and outlet pipes is expected to increase the return capacity of the District in meeting the dry period needs of the Banking Partners and

help with operational flexibility of the recharge Facility, thereby improving water supply management for the District's groundwater banking and management program; specifically, the *Recovery* and *Return* elements of the program, in making groundwater supplies available for in-District and Banking Partner uses during dry years and drought conditions. The total amount of water expected to be better managed is 67,200 acre-feet over the 30-year life of the project, equal to 2,240 acre-feet annually when normalized over that time period (following logic above).

*Will the project make **new information available to water managers**? If so, what is that information and how will it improve water management? What is the estimated **quantity of water better managed** as a result of the project and how was this estimate calculated? What **percentage** of the total water supply is being better managed?*

Water that is artificially recharged at the Facilities will move from the shallow to the deep aquifer zones over time (i.e., during time periods under which there is no *Recovery*, water will continue to infiltrate deeper into the ground). Increased water recovery capability in the deeper aquifer zones and return capacity from implementation of this Project alters the frequency at which water supplies can be removed and recharged in the aquifer. That is, the additional 2,240 AF of normalized annual pumping from the underlying aquifer makes an equivalent 2,240 AF of storage available for future recharge. The ability to pump and recover more water supplies from the increased number of equipped wells removes the water from the finite aquifer allowing for subsequent storage of additional wet year supplies. Thus, the water better managed through increased pumping capacity should also equate to potential water conservation offsetting demands requiring surface water deliveries to Semitropic, via the SWP, and groundwater pumping during dry years and drought conditions (i.e., water better managed and water conserved are equal in this scenario, due to the increased aquifer capacity for banking wet years supplies for use during dry years). Therefore, water better managed equates to 11,200 acre-feet per year for a dry year or 18% of total annual water supplies, or 2,240 acre-feet annually for a lifetime of 30 years.

Well Benefits:

*What is the **estimated capacity of the new well(s)**, and how was the estimate calculated? How much water do you plan to extract through the well(s)?*

Each well will have an anticipated outflow of 3.36 cfs, based on a conservative estimate from average well production in the District. Well outflow estimates were acquired from a separate program in which both District-owned and individual landowners pump groundwater resources for *Recovery* efforts in support of the Banking Program.

The accumulated outflow value is equivalent to 6.67 acre-feet per day following a conversion from cubic feet per second to acre-feet per day. Note that this assumed the pumps maintain the outflow rate for an entire 24-hour period, which in practice is correct during groundwater *Recovery* periods (SWSD GWMP, 2012). For all seven equipped wells, the recovery capacity from the underlying aquifer would be around 47 acre-feet per day (6.67 AF/day x 7 wells). As stated above, for an average month the recovery capacity would be around 1,400 AF/month (47 AF/day x 30 days), or 11,200 acre-feet per recovery period (typically for an 8-month period). Recall that based on the frequency of groundwater banking *Recovery* years, it is estimated that pumping (or dewatering of the aquifer) would occur 6 out of every 30 years (DWR, 2015; KCWA, 2011). This equates to approximately

67,200 acre-feet of returned banked water supplies over the 30-year life (11,200 AF/year x 6 years), or 2,240 acre-feet per year normalized over the life of the Project (67,200 AF / 30 years).

*Will the well be used as a **primary supply or supplemental supply** when there is a lack of surface supplies?*

The well will be used to provide the District and its banking partners with **supplemental supply** when there is a lack of surface water during dry years and drought conditions. The Banking Program utilizes excess and available surface water supplies for recharge during wet years, effectively recharging the aquifer underlying the District. Water supplies are then pumped out of the ground during dry years and drought conditions during a time where surface water deliveries are lower than normal allocations (assumed less than 40% of normal SWP allocations to water districts and agencies, for the purposes of this application).

*Please provide information documenting that proposed well(s) will **not adversely impact the aquifer** they are pumping from (overdraft or land subsidence). At a minimum, this should include aquifer description, information on existing or planned aquifer recharge facilities, a map of the well location and other nearby surface water supplies, and physical descriptions of the proposed well(s) (depth, diameter, casing description, etc.). If available, information should be provided on nearby wells (sizes, capacities, yields, etc.), aquifer test results, and if the area is currently experiencing aquifer overdraft or land subsidence.*

The following table provides physical descriptions of the wells proposed for pump equipping under this Project. Since the wells already exist, and this Project proposes only equipping the wells with pumps, motors, discharge pipelines, and electrical equipment, much of the environmental analysis had already been performed during original well construction, as mentioned in Section 4.0. The environmental analyses and documentation contains information regarding well impacts on the aquifer, and their potential frequent use (once equipped) as part of the groundwater Banking Program. Note from Figure 2 that the well locations are nearby the Facility used to recharge water supplies as part of the Banking Program.

Well No.	Well Name	Well Depth (ft)	Borehole Dia. (in)	Casing Dia. (in)	Casing Material
1	2008-26-S	450	32	24	Steel/PVC
2	2008-25-S	440	32	24	Steel/PVC
3	2008-24-FP	986	32	24	Steel/PVC
4	2008-23-FP	910	32	18	Steel/PVC
5	2008-27-S	380	32	18	Steel/PVC
6	2008-28-FP	900	32	18	Steel/PVC
7	2008-29-S	410	32	18	Steel/PVC

*Describe the **groundwater monitoring plan** that will be undertaken and the associated monitoring triggers for mitigation actions. Describe how mitigation actions will respond to or help avoid significant adverse impacts to Third Parties that occur from groundwater pumping.*

Semitropic has groundwater monitoring wells in each of spreading ponds at the Facilities equipped with water level sensors. A map of the monitoring well locations is shown

in Figure 5. This analysis provides for groundwater monitoring at the site where groundwater banking and *Recovery* efforts are actively performed. The infiltration of recharged water supplies in the underlying aquifer is monitored as well as the potential hydrologic conductivity between aquifer regions across the District (i.e., the movement of water laterally across the District). To that extent, more monitoring wells besides those shown in Figure 5 are located across the District.

3.4.2 Evaluation Criterion B – Drought Planning and Preparedness

*Explain how the applicable **plan addresses drought**. Proposals that reference plans clearly intended to prepare for and address drought will receive more points under this criterion. Explain whether the drought plan was developed with **input from multiple stakeholders**. Was the drought plan developed through a collaborative process?*

The District has not filed a standalone drought plan, but has included a Drought Management Plan section in the 2015 Agricultural Water Management Plan (AWMP) filed with the California Department of Water Resources (DWR). The 2015 AWMP was developed with input from the cities and county within the District service area. To the extent that the District has identified potential impacts from perennial or long-term dry conditions, they have taken steps towards addressing reduced surface water supplies and curbing agricultural demands. Many of the planning associated with these identified impacts, as well as quantification of water supplies and demands in the District, was covered in their 2015 AWMP. The District is committed to monitoring and addressing the potential impacts of sustained drought conditions (e.g., decreased surface water deliveries, heavy groundwater use reliance and resultant subsidence, fallowing and agricultural economic impacts) with neighboring agencies and regional growers.

*Does the drought plan include consideration of **climate change impacts** to water resources or drought?*

The District addressed this issue in their 2015 AWMP (SWSD, 2016) following discussion and quantification of water supplies and agricultural water demands. That plan discusses the expectation of climate change impacts to increase both daytime and nighttime temperatures in the region (DWR, 2012). This general increase in temperatures, coupled with greater variability and unpredictability in precipitation, is expected to lead to greater year-to-year variability in hydrologic conditions (i.e., more drought conditions and limited wet year events). More on the impacts of potential climate change events on the region, specifically with regards to water supplies, is covered in the following Section 3.4.3.

*Describe how your proposed drought resiliency **project is supported by an existing drought plan.** Does the drought plan identify the proposed project as a potential **mitigation or response action**? Does the proposed project implement a **goal or need** identified in the drought plan? Describe how the proposed project is **prioritized** in the referenced drought plan?*

The Drought Management Plan in Semitropic WSD's 2015 AWMP discusses the importance of monitoring groundwater elevations to support the District's conjunctive management and banking operations. The plan identifies the project as a response action in that exercising conjunctive management by increasing extraction of groundwater from wells compensates for reduced deliveries of surface water. Using these district-owned wells to transfer water within the service area is also identified as the District's primary approach to demand

management inasmuch as it offers flexibility and responsiveness to water users in the District. The General Project Service Charge (GPSC), explained in the plan, is applied on a per-acre basis to collect District capital obligations to District projects which include conveyance facilities. In 2013, the GPSC was increased substantially to improve the ability to provide funding in part for these additional water supply programs.

One of the District's major groundwater banking partners, the Metropolitan Water District of Southern California (MWD) completed a drought plan in 1999. In MWD's "Water Surplus and Drought Management Plan" the topic of "Storage of State Water Project Supplies" is addressed, which includes description of how SWP surplus are stored and transferred through agreements into the groundwater basin underlying the District. When addressing Shortage Actions from drought conditions, the plan discusses the reliance on drawing out-of-region storage from the District, and other storage and banking agencies, to help mitigate negative impacts to their urban demands from water shortages. To that extent, MWD provides the rationale for calling on water supply return from this banking program as a relatively early Resource Action during a water shortage. The District has identified well equipping as in direct compliance with MWD's drought Resource Actions.

Castaic Lake Water Agency (CLWA), another one of the District's banking partner also addresses drought conditions in its 2010 Urban Water Management Plan (UWMP). CLWA's drought plan addresses external storage and recovery of water supplies, specifically the Upper Santa Clara River IRWM Plan, explicitly mentions the proposed Project and how improvements to banked water recovery can provide for greater reliability for water supplies. CLWA's 2010 UWMP indicates that during critical dry year conditions that they are dependent on supplies from long- term groundwater banking programs in which they actively participate (including Semitropic's). As a result, alleviation of drought impacts is highly dependent on accessing the much needed dry-year supplies which is not possible without additional extraction capacity.

The proposed Project for equipping wells with the infrastructure necessary to *Recover* and *Return* banked water supplies is also explicitly mentioned in the Upper Santa Clara River Integrated Regional Water Management (IRWM) Plan for the return of water supplies to CLWA. Sections of the plans mentioned above are included in Appendix A.

3.4.3 Evaluation Criterion C – Severity of Actual or Potential Drought Impacts

What are the ongoing or potential drought impacts to specific sectors in the project area if ***no action*** *is taken (e.g., impacts to agriculture, environment, hydropower, recreation and tourism, forestry), and how severe are those impacts?*

If the proposed Project is not implemented, there would be no increase in the capability of Semitropic to *Recover* and *Return* banked water supplies from their underlying aquifers. Beyond meaning that in-district and banking partner demands may go unsatisfied, relying strictly on current *Recovery* capability may lead to the scenario where wet year water supplies are available but there is no capacity for recharge (as described in Sections 3.2.2 and 3.4.1). Most in- district demand consists of agricultural uses, as noted below and in the District's 2015 AWMP (SWSD, 2016), and any decrease in District

supplies to their users would result in a greater demand on groundwater supplies in the region (i.e., if the District cannot supply water, the growers will pump groundwater to meet demands).

Some communities, rural residences, and business in Northern Kern County (in and around Semitropic) rely on groundwater from the aquifers as their principal supply, either lacking the current demand for or infrastructure necessary to convey surface water supplies to their locations. Should climate change result in a reduction in water available from surface supplies, the increased frequency and quantity of groundwater pumping by other agricultural, municipal, and other users will lead to a decrease of groundwater in storage without the necessary means of replenishing the depleted groundwater. In essence, those users currently relying on groundwater as their primary means of supply may find themselves competing with other users in the near future for those limited, and already stressed, resources. According to a CAWSC study (Hanson et al., 2010), counties across the Central Valley including Kern County should expect such a scenario due to the identified impacts of sustained drought conditions, along with land surface subsidence, and the dewatering of aquifer materials beyond that which has been experienced historically.

*Whether there are **public health concerns** or social concerns associated with current or potential drought conditions (e.g., water quality concerns, increased risk of wildfire, does the community have another water source available to them if their water service is interrupted,)*

Many of the communities in the surrounding region are considered disadvantaged communities (DACs) based on a comparison of the statewide median household income ($48,574 for 2010-2014 based on ACS Census data) to the population-weighted average household income level. Regarding the extensive use of groundwater supplies by these DACs, efforts proposed by the District as part of the Poso Creek IRWM Group have focused on projects and programs that benefit the underlying groundwater basin. In this regard, recall that the agricultural water management districts and DACs, as well as other cities and M&I users, share a groundwater basin that is hydraulically connected and utilized by all users in the Region. In many cases, DACs rely exclusively on pumped groundwater as supplies for their residents.

Accordingly, any decline in water levels due to extensive use under drought conditions will be felt by all users, including the regional DACs that rely on the groundwater for their supplies. This is expectedly due to an associated increase in the use of power and energy resources (environmental burden), as well as infrastructure (well) upgrades which become necessary to pump groundwater from deeper in the aquifer. The results can be detrimental to the DACs, since availability from other water sources in this scenario are very limited and may lead to interruption in services. To that extent, projects and programs such as the proposed Project works to mitigate declines in water levels will provide benefits to other groundwater users in the surrounding region. This is accomplished by maintaining levels in Semitropic through the storage of wet year supplies, thus leading to less competition for other hydrologically connected groundwater resources.

*Whether there are ongoing or potential **environmental impacts** (e.g., impacts to endangered, threatened or candidate species or habitat)*

There are no impacts related to endangered or threatened species in the District's

service area or facilities. However, as explained in Section 3.4.1, the District receives surface water deliveries and stores them in its water bank on behalf of several SWP Contractors. Some of the District's neighboring districts are CVP contractors. Any water conveyed south of the Bay-Delta involves pumping constraints that are in place to support endangered and threatened species. The proposed Project helps with flexibility of water supplies south of the Delta.

Kern County is also known to have more than two dozen threatened and endangered species that are land-based mammals. The three primary endangered species known to live within the District's boundaries, per the federally-recognized candidate listing, are the San Joaquin Kit Fox, Tipton Kangaroo Rat, and the San Joaquin Wooly threads. The proposed Project is not expected to lessen or improve the status of these species.

Whether there are ongoing or potential, local, or ***economic losses*** *associated with current drought conditions (e.g., business, agriculture, reduced real estate values)*

Most of the District's water use is for agricultural purposes, and some industrial (some of which related to agriculture), commercial, and domestic users and communities in the Region that use water and typically rely on groundwater as the sole source of supply. The economic fiber of the Region depends on the effective, efficient, and conjunctive use of surface water supplies and groundwater from the common groundwater basin. As such, being able to replenish the basin with wet year and excess surface water supplies means less competition between users in the region (i.e., some water supplies that are banked end up being used for in- district uses). The consequences of failing to increase water supply reliability, include increased costs of agricultural production; decreased cropped and irrigated acreage; decreased workforce; and significant economic losses, both locally and statewide. As the drought continues to threaten the reliability of imported surface water on an annual basis, the reliance on other sources of supplies becomes more pronounced.

Regarding banking partners, this Project can provide a more reliable source of supply since most of their water use is for municipal users, including industrial and residential users. For these regions, most notably Los Angeles and the surrounding areas, water supplies are critical for an economy of much large scale and impact to the state.

Whether there are ***other drought-related impacts*** *not identified above, including tensions over water that could result in a water-related crisis or conflict, for example.*

The Project is the result of collaboration among neighboring water agencies. In particular, in 2005, the District joined with neighboring water agencies to develop the Poso Creek IRWM Plan (Plan) for the region. In addition to Semitropic, the agencies that developed and adopted the Plan included, Shafter-Wasco Irrigation District, North Kern Water Storage District, Cawelo Water District, Kern-Tulare Water District, and Delano-Earlimart Irrigation District. These agencies represent about 350,000 irrigated acres and a gross area of 0.5 million acres. These agencies represent SWP, CVP, and local Kern River water supply contractors.

As recognized in the Plan, projects that result in improved management of groundwater supplies in the region benefit all users because of the widespread reliance on the underlying common basin resource. Therefore, the proposed Project which helps improve the reliability of regulated groundwater supplies for regional and banking interests, is

supported by several neighboring districts, and helps to prevent water-related crisis and reduce conflict.

*Is the project in an area that is currently **suffering from drought** or which has recently suffered from drought? Please describe existing or recent drought conditions, including when and the period of time that the area has experienced drought conditions (please provide supporting documentation, [e.g., Drought Monitor, droughtmonitor.unl.edu]).*

According to the U.S. Drought Monitor, sponsored by the U.S. Department of Agriculture and the National Drought Mitigation Center: Semitropic, as well as much of the Southern San Joaquin Valley in California, is experiencing 'Exceptional Drought (D4).' This has resulted in little or no surface water deliveries to users in the region, and many fallowed fields due to inadequate water supply. The latest release of this information was March 29, 2016. As with much of the Central Valley of California, current drought conditions have persisted, with minimal relief and precipitation events, over the past four years (since 2011).

*Describe any projected increases to the severity or duration of drought in the project area resulting from **climate change**. Provide support for your response (e.g., reference a recent climate change analysis, if available)*

The District's 2015 AWMP analyzed the effects of climate change on agricultural water supply and demand. The future of the District's water supply will be driven mainly by changes in hydrology and particularly by the volume, variability, and timing of precipitation of the Sacramento-San Joaquin River Delta, as the receiving watershed area is the source of supply for the SWP, the primary source of surface water for the District. For many climate change scenarios, and a range of future climate projections studied (Chung et al. 2009), the reliability of the SWP and CVP water supply systems is expected to be reduced from less frequent and intense precipitation events. Decreases in surface water deliveries to areas south of the Sacramento-San Joaquin River Delta, directly affecting the water volume supplied to Semitropic, includeing potential 'excess' volumes which could be stored and recharged.

Two models predicted that the District's service area will become warmer and drier relative to historic conditions in response to assumptions of increasing greenhouse-gas emissions (USGS 2009, CEC 2015). Based on these projections, climate change could result in potentially longer and more frequent drought conditions, increased demands for irrigation water with reduced surface water deliveries that would be met by increasing groundwater pumping. This, in turn, would likely lead to increased depths to groundwater and increased land subsidence. These combined effects have the potential for the District to rely more on groundwater to supplement years where surface supplies are inadequate to meet demand.

3.4.4 Evaluation Criterion D – Project Implementation

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

The Project will be implemented as follows: Activities would begin around September 1, 2016; design is complete; construction would be completed by the end of February 2017; and all project work and reporting would be completed by June 2017. A draft Project Completion Report will be submitted to Reclamation for Project Manager's comment

and review no later than 90 days after project completion, followed by a Final Report addressing comments. The report shall be prepared and presented in accordance with the provision of a grant contract. A Gantt Schedule estimating the phases and milestones for completion of the work is shown in Appendix A.

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

It is anticipated that no regulatory permits will be required, inasmuch as all construction components are added items to existing District facilities on previously disturbed land. An evaluation will be made by District Counsel regarding whether construction of the Project will require any additional permits. It is noted that the District is not subject to the County's jurisdiction with regard to building and grading permits. Accordingly, no County-issued permits will be required. The District will comply with CEQA and NEPA before commencing any ground disturbing activities, as discussed further in Section 4.0. Additionally, a pre-activity survey will be conducted by a qualified biologist prior to the start of construction.

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

The Project will be constructed on District-owned property. The District has completed all design work for equipping and plumbing of seven wells at the spreading Facilities.

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

The District's Banking Program has been established and the wells proposed for equipping have already been drilled, as such, no new policies or administrative actions are required to implement this Project.

3.4.5 Evaluation Criterion E – Nexus to Reclamation

*How is the proposed project **connected to a Reclamation project** or activity? Does the applicant receive **Reclamation project water**?*

The District is not a long-term CVP contractor of Reclamation-managed water supplies. Semitropic has purchased CVP-Friant water that has been available from time to time, typically during the peak runoff period of wet years. In addition, the District's immediate neighbors are CVP-Friant contractors; namely, the Southern San Joaquin Municipal Utility District and the Shafter-Wasco Irrigation District. To facilitate mutually beneficial transfer and exchange arrangements, as well as water banking exchanges, with neighboring water agencies, the District has constructed facilities that have added inter-district conveyance capacity involving Reclamation project water supplies. Most of the District's banking partners are also not CVP Contractors, but may have individual agreements for transferred or exchanged water supplies with federal contractors outside of District agreements and banking operations.

*Is the project on **Reclamation project lands** or involving Reclamation facilities?*
Yes. The Project is in the CVP place of use.

*Is the project in the **same basin** as a Reclamation project or activity?*

As mentioned in Section 3.2.2, the District overlies a usable groundwater basin, the Kern County Subbasin of the Tulare Lake Basin, which is actively and conjunctively managed. The District's immediate neighbors are CVP-Friant contractors with the infrastructure and conveyance systems used to deliver project water to their respective service areas. These neighbors, as well as others, rely on the same groundwater basin for their supplies when supplemental surface water is inadequate to satisfy demands.

*Will the proposed work **contribute water** to a basin where a Reclamation project is located?*
The Project will contribute to the temporary holdover of water supplies in a basin that is a Reclamation CVP place of use.

*Will the project help Reclamation meet **trust responsibilities to any tribe(s)**?*
There are no tribal areas in the immediate Project area. The Project will not be able to help Reclamation meet any trust responsibilities.

3.5 Performance Measures

Groundwater Recharge (Conjunctive Use):
The District will utilize pre-Project and post-Project methods to evaluate the Project performance with regard to groundwater recharge. The District maintains historical groundwater elevation level data for production wells and monitoring wells. The post-Project performance will be measured by documenting the amount of time each pump motor operates with totalizing meters and the volume of water that is discharged. The District will continue to maintain groundwater elevation data so that it can compare pre-Project and post-Project water level conditions. The District also measures the amount of water that is recharged and recovered at the Facilities. These data exist back to 2010 when the facility became operational and both data sets can be compared for performance measurement.

Increasing Energy Efficiency in Water Management:
The energy required by the District to pump the existing wells and the water pumped is recorded daily, and reconciled monthly. Therefore, the power meter readings and acre-feet pumped will be gathered and assessed as a kilowatt hour (kWh) per acre-feet (AF) efficiency value assessed as part of Banking Program management. The data will be compared between other deep wells and shallow wells, both District and privately owned, and will be used to quantify how much energy was used to operate the proposed pumps and motors to recover water from the underlying aquifer. This can also be compared to the costs associated with recovering water prior to the implementation of the proposed Project. The efficiency improvement will be presented in both energy (kWh/AF) and water flow units.

Groundwater Substitution Transfers:
The District maintains records of all water banked, recovered and used through "in-lieu" processes. To evaluate the Project's performance, the District can present these quantities over time from prior to Project implementation to post in order to prove higher return of stored water to Banking Partners. The increased *Return* capacity of the pumps during dry years and drought conditions provides a measure for the drought resiliency claim of this Project.

4.0 Environmental and Cultural Resource Compliance

The following section summarizes the District's approach to avoid, minimize, and mitigate any potential environmental impacts related to construction of the proposed Project. The Project will be constructed in compliance with California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements.

The District has already completed a CEQA document for the Pond-Poso Spreading and Recovery Facility (Facility) that covers the scope of the proposed Project. Reclamation also completed a NEPA document in 2010 that covers the scope of the proposed project. The Environmental Assessment (EA), entitled "Semitropic Water Storage District Pond-Poso Spreading and Recovery Facility," concluded by signing a Finding of No Significant Impact, FONSI-09-134. The scope of the Project in the 2010 EA included equipping and plumbing the wells at the Facility, in addition to constructing other facilities for the purpose of increasing the direct spreading capacity of the Semitropic Groundwater Bank. The EA was prepared for the purpose of receiving Reclamation grant funding for the American Recovery and Reinvestment Act of 2009 (ARRA). The ARRA Project was awarded $2,200,000; a reduced amount of $5,000,000 originally requested. The reduced funding amount limited project activities to completion of the spreading component, removing the recovery and return components (e.g., equipping and plumbing wells) from the project work.

The preceding phase to this Project, *Groundwater Well Extraction Improvements for Return of Stored Water*, was awarded Federal grant funding under the *WaterSMART Drought Resiliency Project Grants for Fiscal Year 2015*, and was proven as being covered as part of the work detailed in the 2010 EA and FONSI, which was developed to receive the funding of the previous ARRA grant. In 2016, the District received a letter of concurrence from Reclamation to use the 2010 EA for this year's grant application as well. All wells proposed in this application have therefore received environmental clearance based on the 2010 EA. However, the Project description of the proposed Project will be reviewed by Reclamation to determine the level of NEPA environmental documentation that may remain prior to commencement of construction activity.

Impacts on Surrounding Environment:

The extent (footprint) of the Project is relatively small and located exclusively within the previously evaluated area of potential effects covered in the 2010 EA. All of the proposed work is on actively disturbed land owned by the District. These rights-of-way are surrounded by lands that have been fully developed into irrigated agricultural land areas for decades.

Construction of the proposed Project will involve minimal soil disturbing activities that will have minimal impact on the air in the surrounding environment, insomuch as the majority of the work involves installation of pumps, motors, discharge piping and installation of electrical equipment at existing recovery wells. No impacts to water or animal habitat is expected. To minimize impacts from soil disturbing activities, the District will implement Best Management Practices during construction to mitigate any impacts as follows: construction equipment will be powered down when not in use to reduce unnecessary emissions; dust-control measures will be implemented during all earth-disturbing activities; and all equipment will be tuned and serviced to minimize unnecessary emissions.

Additionally, to minimize impacts to animal habitat, the District will engage a qualified biologist to conduct a pre-activity survey before the start of construction to ensure that the construction area remains unoccupied by sensitive (endangered) species. In addition, standard avoidance and minimization protocols will be will be followed during construction. Moreover, the duration of the construction activity is expected be relatively short (i.e., construction to occur over period of few months within the two year window for utilizing the grant funds).

Impacts to Regional Endangered Species:

The District is aware that threatened and endangered species exist in the Southern San Joaquin Valley. Typically, endangered species habitat is not found within these highly cultivated areas. Natural vegetation is limited to ruderal, non-native grasses and forbs at the project site.

However, certain species are known to exist around the edges of fields. Based on experience and the Kern Council of Governments Habitat Conservation Map and federally-listed species mapping, and review of the FWS Endangered Species Database and California Natural Diversity Database, the only sensitive species with native habitats near the Project are the San Joaquin Kit Fox (protected under the Endangered Species Act), the blunt-nosed leopard lizard, the Tipton Kangaroo Rat, and the giant kangaroo rat. As part of the environmental work, the District will retain a certified biologist to conduct a biological reconnaissance survey and prepare a report to evaluate potential impacts to biological resources within the project sites. It is expected that none will be encountered inasmuch as the project site is in an actively disturbed area. However, if potential impacts are identified, the District will follow recommendations by the biologist to reduce those impacts to a less than significant level.

Buildings and Structures Eligible for National Register of Historic Places:

Reclamation previously consulted with the California State Historic Preservation Officer in December, 2010, regarding the Facility, as part of the preparation of the EA and they have concurred that the proposed Project in this area will not affect historic properties pursuant to 36 CFS Part 800.4(d)(1). If Reclamation deems necessary, the District will retain a private cultural resources management consultant or arrange for Reclamation staff to again carry out a consultation to evaluate if any buildings or structures are eligible under the National Register of Historic Places. The expectation is that none will be identified inasmuch as the project improvements will be constructed in actively disturbed agricultural lands.

Archaeological Sites:

A cultural resources survey was completed as part of the 2010 EA for the Facility of which, the proposed Project is a part of. Reclamation concluded that the proposed Project would have no effect on historic properties pursuant to 36 CFR Part 800.4(d)(1). The proposed project work is to equip wells on the same constructed facilities covered in the FONSI-09-134. As part of Reclamation's EA for the construction of the Facility and determination of FONSI, Reclamation entered into consultation with SHPO on December 10, 2009 requesting concurrence on Reclamation's finding that no historic properties would be affected by the proposed undertaking of the Facility. SHPO concurred in a letter dated December 22, 2009. There will be no significant impacts to cultural resources from the Proposed Action.

If Reclamation deems necessary, the District will work with Reclamation cultural resources staff to obtain clearance for archaeological sites within the project area. The District will retain a private cultural resources management consultant or arrange for Reclamation staff to carry out a consultation to conduct a Phase I intensive pedestrian cultural resource survey, and a cultural resources records search and Native American consultation to evaluate any impacts to cultural sites. Impacts to cultural resources are not expected. Nevertheless, the District is prepared to implement any necessary mitigation measures should cultural resources be identified for any component of the Project.

Water Conveyance System:

The District's irrigation delivery system was completed in the mid-1970s. The District's irrigation delivery system is composed of two canal reaches referred to as the Pond-Poso and Buttonwillow Ridge Canal. In addition, the District operates a series of turnouts, spillway basins, recharge basins, pump stations and discharge pipelines as part of its conveyance system. The District began importing State Water Project water in 1973. The Pond-Poso Spreading and Recovery Facility became operational in 2010. The proposed Project will not alter any existing features of an irrigation system.

Other Environmental and Cultural Concerns:

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

a. There are no wetlands or other surface waters inside the Project boundaries that fall under CWA jurisdiction as "Waters of the United States".
b. Construction of the Project will support the important agricultural-based economy in the Southern San Joaquin Valley and should have only positive impacts on low income or minority persons living in the region.
c. The Project will not limit access to or ceremonial use of Native American sacred sites or tribal lands.
d. The Project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species in the region.

5.0 Existing Drought Contingency Plan

The Drought Management Plan from Semitropic's 2015 Agricultural Water Management Plan (AWMP) is attached in Appendix B. The plan details how the District would prepare for droughts and manage water supplies and allocations during drought conditions.

The Semitropic Water Banking and Exchange program allows other Districts to store water in the groundwater basin underlying the Semitropic Water Storage District. Metropolitan Water District (MWD) is one of the District's primary Banking Partners, with an allowance of up to 350,000 AF of storage, which is 35% of the program's share. The proposed Project will assist in drought resiliency for Banking Partners by providing access to higher return of stored water. Attached is MWD's Drought Management Plan, which points to drawing on the District's storage as one of its main drought actions.

Attached also are relevant pages from the 2010 Urban Water Management Plan (UWMP) prepared for Castaic Lake Water Agency (CLWA) and Valencia Water Company (VWC). CLWA holds both a short-term and long-term storage program with the Semitropic Banking Program. The UWMP lays out its historic storage and withdrawal activities in the Banking Program and notes that in times of drought, CLWA may face competition and limited access to needed water. The UWMP also explains the water available to VWC through Newhall Land and Farming Company (Newhall Land). Newhall Land has available storage capacity of 55,000 AF and its supply is planned only to be available to VWC during drought years.

The Upper Santa Clara River Integrated Regional Water Management (IRWM) Plan also discusses the proposed Project's alleviation to drought through increased return of water supplies to CLWA. Relevant sections from the Plans mentioned are attached in Appendix B.

6.0 Required Permits or Approvals

It is anticipated that no regulatory permits will be required, inasmuch as the work will be performed on previously and actively disturbed District land. In this regard, only permits related to construction may be required and application will be made for these permits prior to construction commencing, although no permits are expected.

An evaluation will be made by District Counsel regarding whether construction of the work will require any additional permits. It is noted that the District is not subject to the County's jurisdiction with regard to building and grading permits. Accordingly, no County-issued permits will be required.

7.0 Letters of Project Support

The District has established long-term, working relationship with its neighboring water districts. Although neighboring water districts are not providing funding to construct the proposed facilities, they are interested in the facilities being constructed and may form water banking agreements in the future based on the use of the spreading, recovery, and return capacity of the District. The well extraction improvements anticipate potential return of stored water for banking partners.

The District has received a letter of support signed by the Chairman of the Poso Creek Integrated Regional Water Management Plan (IRWMP) Regional Water Management Group, which represents seven districts within the Poso Creek IRWMP. The following neighboring water agencies who participate as members of the Poso Creek IRWMP and are supportive of the project include:

- ✓ Cawelo Water District
- ✓ Delano-Earlimart Irrigation District
- ✓ Kern-Tulare Water District
- ✓ North Kern Water Storage District
- ✓ Shafter-Wasco Irrigation District
- ✓ Southern San Joaquin Municipal Utility District
- ✓ North West Kern Resource Conservation District

A copy of this letter of support is included following this page.

POSO CREEK IRWMP
Management Group

1101 Central Avenue, Wasco, CA 93280
661-758-5113

Mr. Jason Gianquinto
General Manager
Semitropic Water Storage District
1101 Central Avenue
Wasco, CA 93280

Subject: Proposed Project – Groundwater Well Extraction Improvements for Return of Stored Water

Dear Mr. Gianquinto:

On behalf of the Poso Creek Integrated Regional Water Management Group (Group), of which Semitropic Water Storage District (Semitropic) is apart, I am writing this letter in support of the well extraction improvement project. By equipping wells for the return of stored water to banking partners, the project will enhance water supply reliability, improve operational flexibility, and help to maintain the economic viability of water use in the region. These three benefits are directly aligned with three of the five primary goals of the IRWMG. The group is clearly interested and supportive of this project which will benefit both the Group, Semitropic, and any its banking partners.

We hope that our expression of support is helpful in your efforts to secure grant funding assistance to implement your plans. If the funding agency would like to discuss our interest and support for your project, we would be happy to do so.

Sincerely,

Dana Munn
Chairman of the IRWM

8.0 Official Resolution

The Official Resolution for the *WaterSMART: Drought Resiliency Project Grants for Fiscal Year 2016* is scheduled for adoption by the District's Board of Directors at the District's May 11th Board Meeting. The draft resolution is provided below and a copy of the signed Resolution will be provided following the Board Meeting.

RESOLUTION OF THE BOARD OF DIRECTORS
OF THE SEMITROPIC IMPROVEMENT DISTRICT
OF THE SEMITROPIC WATER STORAGE DISTRICT

IN THE MATTER OF: RESOLUTION NO. 15-XX

IN SUPPORT OF FILING AN APPLICATION WITH THE BUREAU OF RECLAMATION FOR A GRANT UNDER *WATERSMART: DROUGHT RESILIENCY PROJECT GRANTS (FY 2016)*

WHEREAS, the Semitropic Water Storage District (District or Applicant) partnered with several neighboring water districts in January 2006 and formulated an Integrated Regional Water Management Plan (Plan) for their collective area, which was adopted in July 2007 by each of the districts; and

WHEREAS, the Plan identified improving water reliability as a regional priority and identified the District's water banking program, the direct spreading facility, well extraction, and recovery capacity, projects that regulate water supplies available to the District and its Banking Partners; and

WHEREAS, State and Federal regulatory measures in the Delta have rendered the District's SWP water less reliable, creating an additional need to regulate supplies when they are available from other sources; and

WHEREAS, the District's regulating capabilities can be improved with improvements made to the extraction component of the Pond-Poso Spreading and Recovery Facility; and

WHEREAS, the United States Bureau of Reclamation is currently soliciting proposals for grant funding assistance under their *WATERSMART: DROUGHT RESILIENCY PROJECT GRANTS* (Funding Opportunity No. R16-FOA-006); and

WHEREAS, District Staff has formulated a grant proposal for improvements to the recovery component of the Pond-Poso Spreading and Recovery Facility, referred to as the *Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2*.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the APPLICANT as follows:

a. The District's Board of Directors has reviewed and supports the submission of a grant application to Reclamation entitled Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2;
b. The District's General Manager, Jason Gianquinto, or his designee, is directed to submit the grant application and is authorized to enter into an agreement with Reclamation on behalf of Semitropic for grant funding under Reclamation's *WaterSMART: Drought Resiliency Project Grants*;
c. The Applicant is capable of providing the amount of funding and in-kind contributions specified in the application; and
d. The Applicant will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

ALL THE FOREGOING, being on motion of _____, Director and seconded by _____, Director was authorized by the following vote:

10.0 List of References

The following list of references was cited throughout the proposal document:

California Dept. of Water Resources (DWR), 2004. "Bulletin 118 – Update 2003: California's Groundwater. Kern River Valley Groundwater Basin." Report Basin 5-22.14.

California Dept. of Water Resources (DWR), 2015. "The State Water Project: Final Delivery Reliability Report 2015."

California Department of Water Resources (DWR), 2015. "State Water Project Delivery Capability Report 2015 – Public Draft." DWR Bay-Delta Office.

Chung et al. California Department of Water Resources (DWR), 2009. "Using Future Climate Projections to Support Water Resources Decision Making in California."

Castaic Lake Water Agency (CLWA), CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company, 2010. "2010 Urban Water Management Plan (UWMP)." Board of Directors adopted June 22, 2011. Resolution No. 2011-10.

Hanson, R. U.S. Geological Survey (USGS). 2010. "Conjunctive Use in Response to Potential Climate Changes in the Central Valley, California."

Kern County Water Agency (KCWA), 2011. "Water Supply Report."

GEI Consultants, Inc., 2015. "Fee Schedule and Payment Terms." Standard Fee Schedule 2015.

Metropolitan Water District of Southern California (MWD). 1999. "Water Surplus and Drought Management Plan." Report No. 1150.

Poso Creek Integrated Water Management (IRWM) Group, 2007. "Poso Creek IRWM Plan."

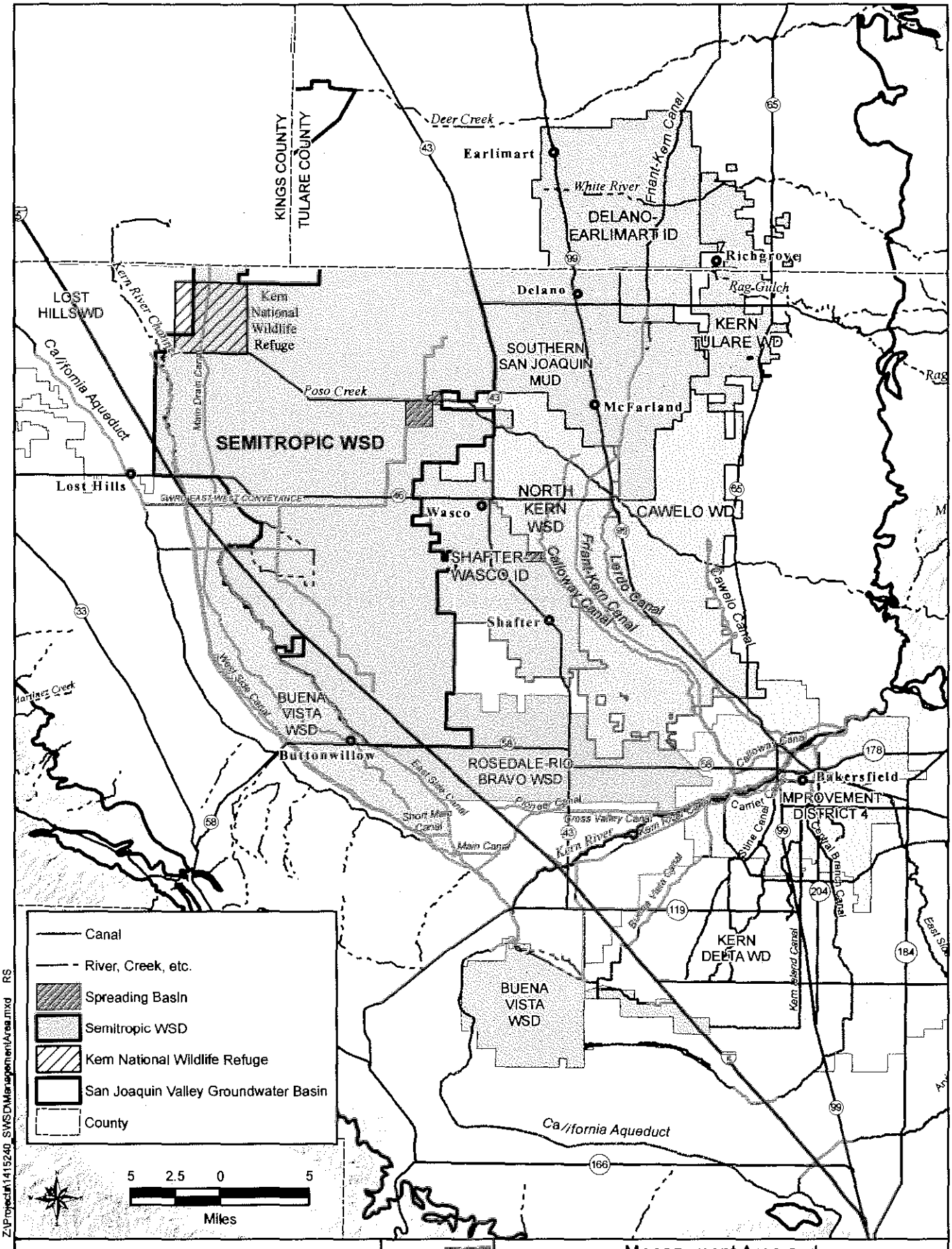
Semitropic Water Storage District (SWSD), 2016. "2014 Agricultural Water Management Plan (AWMP)." Board of Directors adopted March 9, 2016. Resolution No. ST 13-12.

Semitropic Water Storage District (SWSD), 2012. "2012 Groundwater Management Plan (GWMP)." Board of Directors adopted 2012.

Upper Santa Clara River Watershed Integrated Regional Water Management (IRWM) Group, 2014. "Upper Santa Clara River Watershed IRWM Plan – 2014 Update."

U.S. Geological Survey (USGS), California Water Science Center. Fact Sheet 2009-3074. 2009. "Effects of Climate Variability and Change on Groundwater Resources in the United States".

Appendix A - Proposal Figures



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23-Mar-2015

Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2

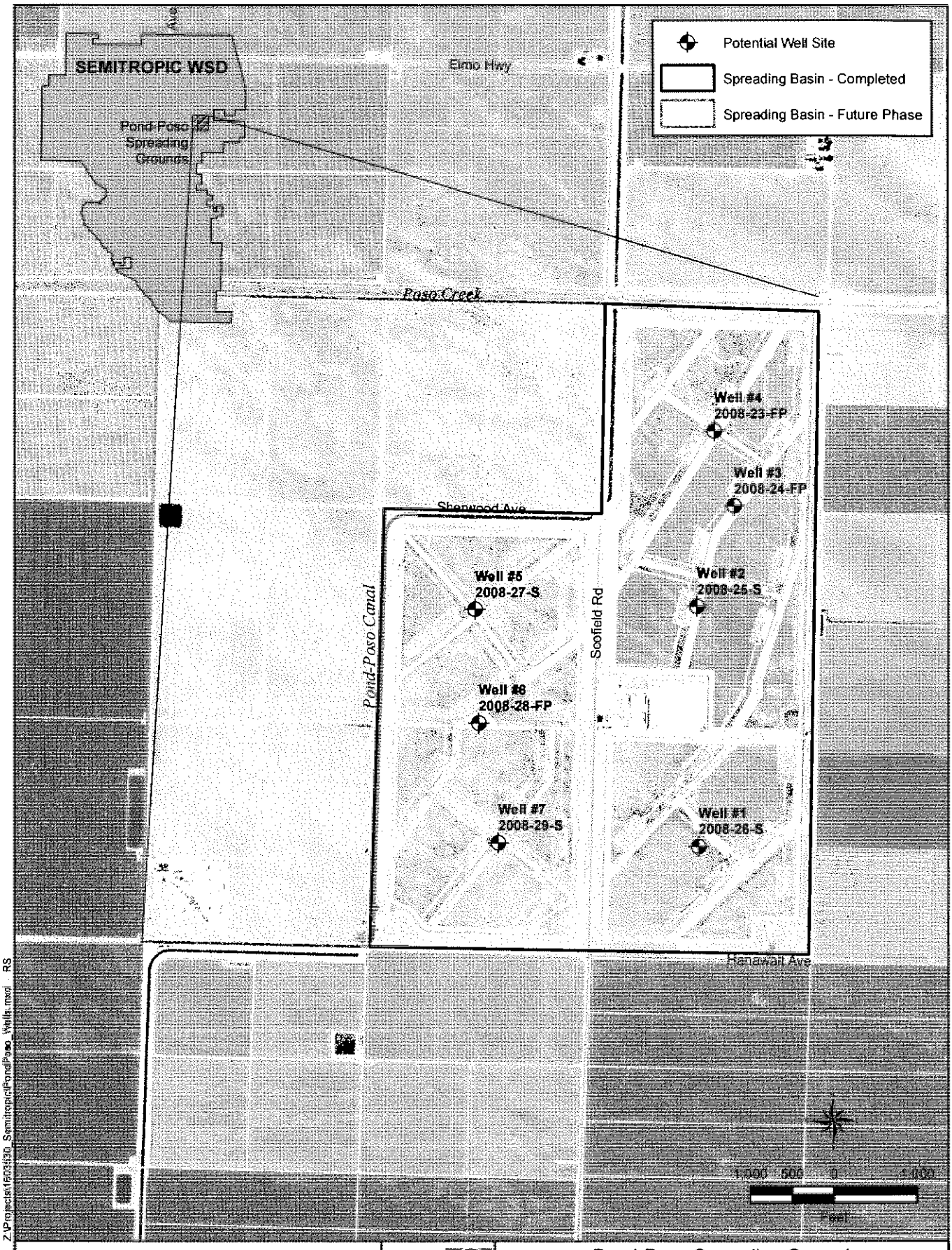
Semitropic Water Storage District

GEI Consultants

Management Area and Neighboring Water Agencies

APRIL 2016

FIGURE 1



Drought Resiliency Project: Phase 2
Kern County, California Semitropic
Water Storage District

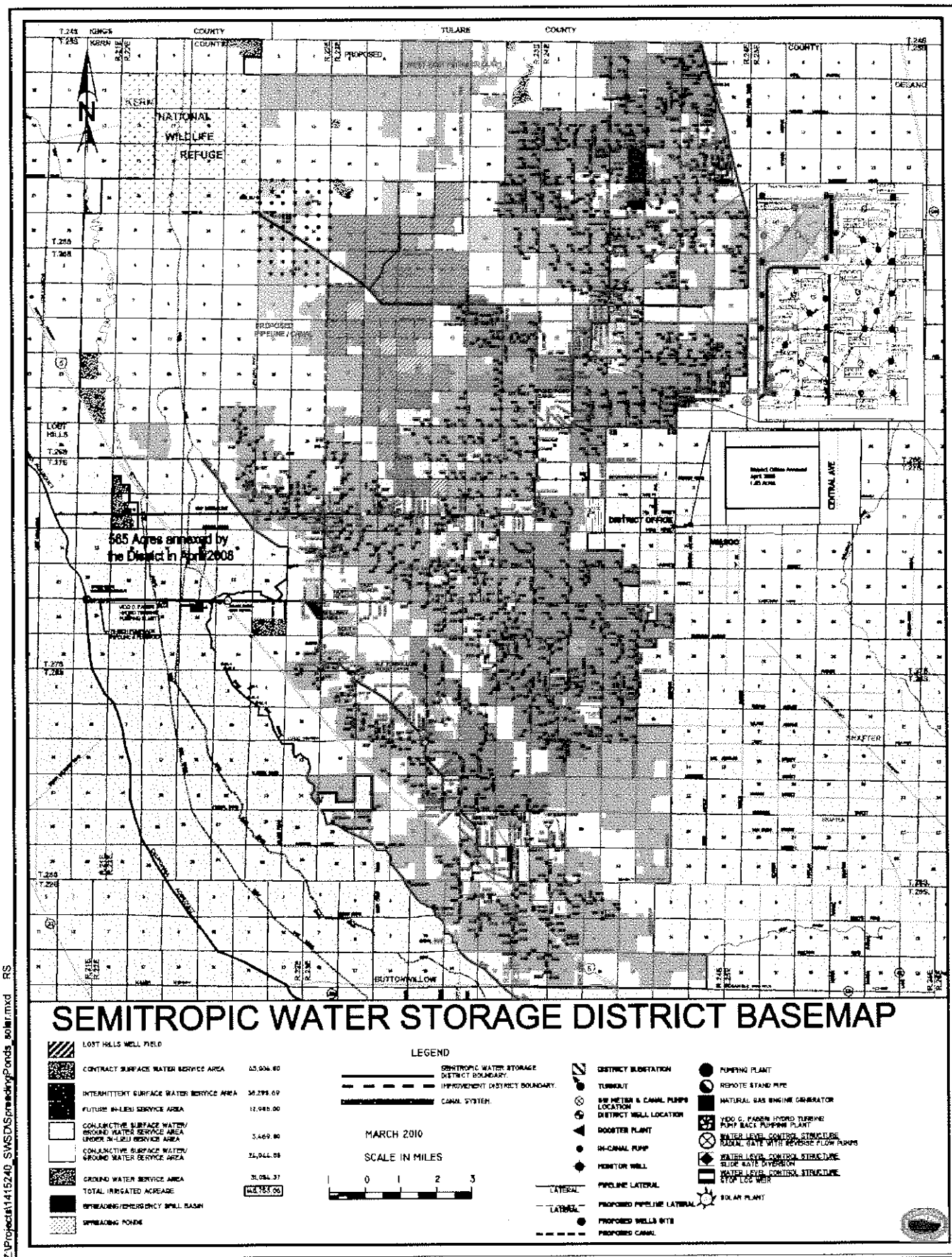
GEI Consultants

Pond-Poso Spreading Ground
Wells to be Equipped

APRIL 2016

FIGURE 2

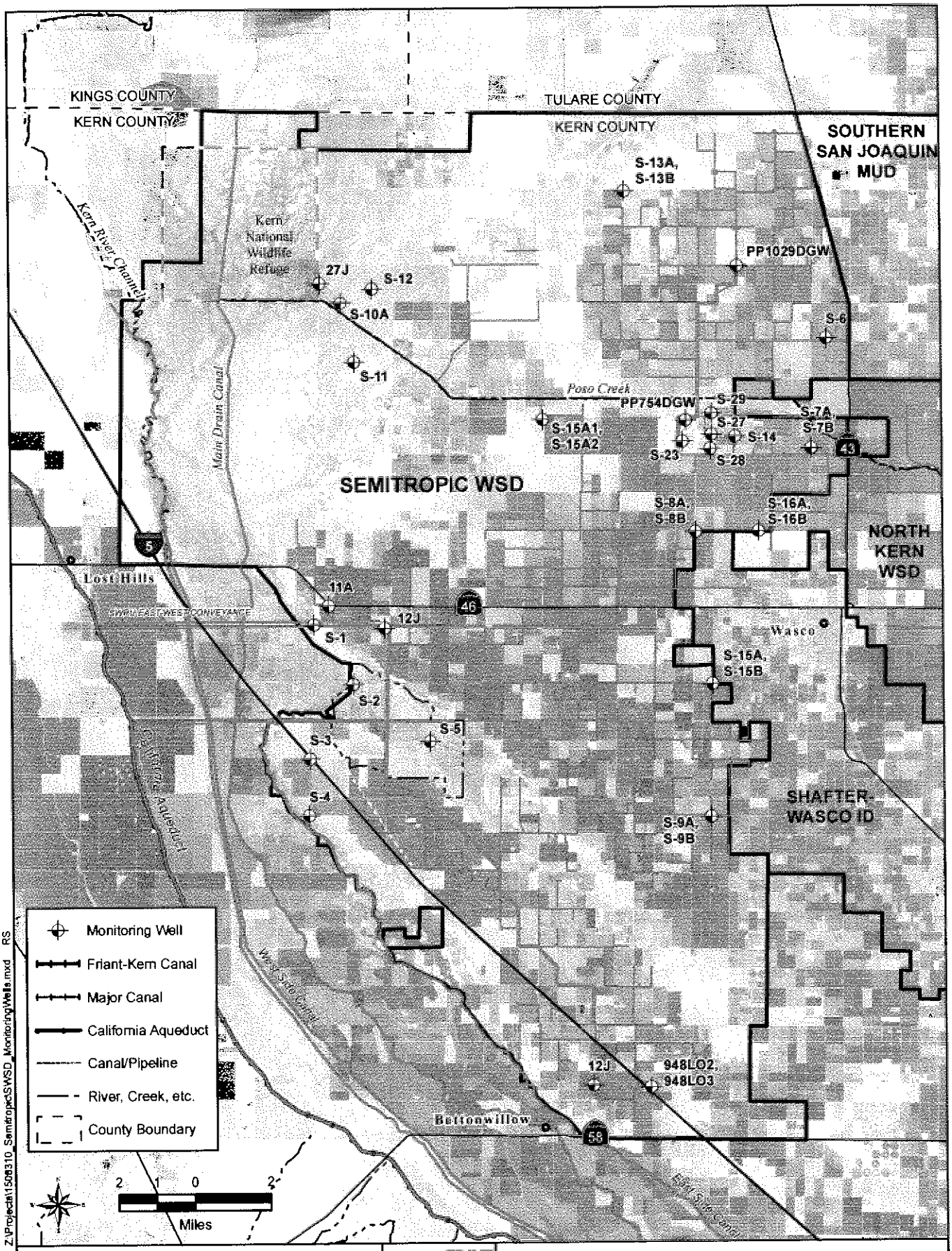
05-Apr-2016 Z:\Projects\1\703930_Semitropic\PondPoso_Wells.mxd RS



SEMITROPIC WATER STORAGE DISTRICT BASEMAP

Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2	Semitropic Water Storage District Basemap
Semitropic Water Storage District	APRIL 2016
GEI Consultants	FIGURE 4

23-Mar-2015 Z:\Projects\1415240_SWSD\Spreading\Ponds_solar.mxd RS



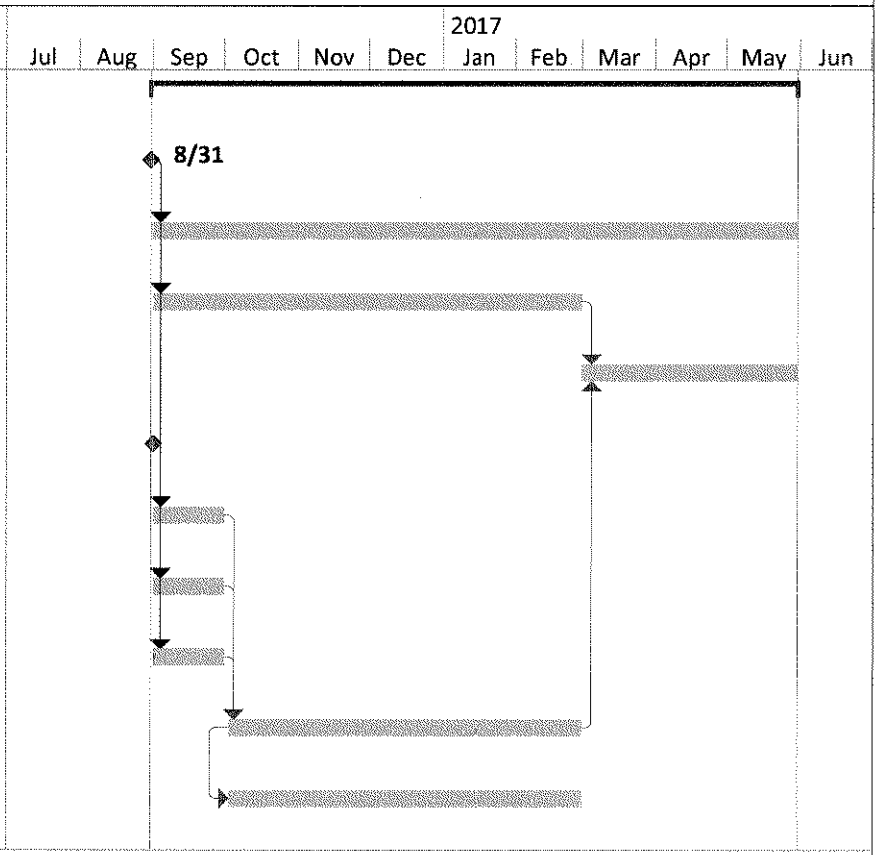
Z:\Projects\1508310_SemitropicSWSD_MonitoringWells.mxd RS

24-Jun-2015

Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2	GEI Consultants	Monitoring Wells
Semitropic Water Storage District		APRIL 2016 — FIGURE 5

Appendix A: Project Schedule

ID	Description	Start	Finish
1	**Groundwater Well Extraction Improvements for Return of Stored Water: Phase 2**	**8/31/16**	**5/30/17**
2	Grant Agreement Signed	8/31/16	8/31/16
3	Task 1 - Grant Administration	8/31/16	5/30/17
4	Task 2 - Project Reporting	9/1/16	2/28/17
5	Project Completion Report	3/1/17	5/30/17
6	Task 3 - Project Design	8/31/16	8/31/16
7	Task 4 - Environmental Documentation	9/1/16	9/30/16
8	Task 5 - Permits & Approvals	9/1/16	9/30/16
9	Task 6 - Procurement Process	9/1/16	9/30/16
10	Task 7 - Project Construction (Equipping of Wel	10/3/16	2/28/17
11	Task 8 - Construction Administration	10/3/16	2/28/17



Appendix B – Drought Plan Documents

This appendix contains pages from the below-listed documents referenced in Section 5:

- 2015 Semitropic Water Storage District Agricultrual Water Management Plan
- Metropolitan Water District of Southern California Water Surplus and Drought Management Plan
- 2010 Santa Clarita Valley Urban Water Management Plan
- Upper Santa Clara River Proposition 84 IRWM Drought Grant

Appendix C - Construction Cost Estimates

The following pages contain supporting cost estimates to the budget narrative and tables explained in Section 9.0.

Semitropic Water Storage District

Well Drilling

2016 RATE SHEET

Prepared: 2/22/2016

District Owned Equipment, $/Day	Billing Rate	
Drilling Rig	$ 1,038.44	
Backhoe	25.44	
Air-compressor	26.79	
Tractor - Kenworth	31.82	
Tractor - Other	31.52	
Well Pulling Unit	278.33	
Service Truck and Trailer	16.01	
Well Developing Equipment	234.34	
1-Ton Truck	13.99	
1/2 - Ton Truck	11.23	
3800 Gallon Water Tank	10.50	
Well Log Camera	400.00	Per well (includes labor)

District Labor, $/Hr	
Drilling Consultant	$ 93.76
Staff Engineer	72.29
Driller 1	60.87
Developer	61.17
Drilling Helper	42.02
Welder	42.02
General Maintenance	42.02

Notes:

1) Overtime rates will be charged at 1.5x for work over 8 hours in a day.

2) Vehicle mileage will be charged at $0.54 per mile

EXHIBIT A

Electrical Hookup Well Costs

Well Name	Starter	Transformers, Bank Supplies CT's etc.	BackBoard	Misc.	Grand Total Phase 4
Well #1	$8,500.00	$6,000.00	1,000.00	$7,000.00	**$22,500.00**
Well #2	$8,500.00	$6,000.00	1,000.00	$7,000.00	**$22,500.00**
Well #3	$7,000.00	$6,000.00	1,000.00	$7,000.00	**$21,000.00**
Well #4	$3,000.00	$6,000.00	1,000.00	$7,000.00	**$17,000.00**
Well #5	$8,500.00	$6,000.00	1,000.00	$7,000.00	**$22,500.00**
Well #6	$3,000.00	$6,000.00	1,000.00	$7,000.00	**$17,000.00**
Well #7	$8,500.00	$6,000.00	1,000.00	$7,000.00	**$22,500.00**
				Sum	**$145,000.00**

Semitropic Water Storage District and
Equipment Procurement Costs, Phase 2 and 3

Well Pump and Motor Unit and Discharge Piping Costs

Well Name	Motor	Pump Head & Bowl Assembly	Flow Path Insert					Column Pipe				Tube and Shaft				Head Shaft & Nut, Tube Stub Shaft, Shaft Couplings	Stinger Pipe				Cone Strainer	Discharge Piping				Well Discharge and Appurtenances										Grand Total Phase 2 & 3
			Qty	Unit	$/Unit	Total	Blind Flange	Qty	Unit	$/Unit	Total	Qty	Unit	$/Unit	Total		Qty	Unit	$/Unit	Total		Qty	Unit	$/Unit	Total	90-deg Elbows	45-deg Elbows	Flanges & Gaskets	Victaulic Couplings or Vic Flange	GRV Flange Adapter & Nipple	Adjustable Pipe Support	Bolts	2" Air Vents	Meter Test Tap	12" Strap-on Meter	
Well #1	$22,748.00	$35,394.00						320	LF	$35.74	$11,436.80	320	LF	$24.94	$7,980.80	$1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	50	LF	$15.38	$769.00	$154.53	$148.36	$76.16	$212.40	$217.60	$242.44	$18.36	$26.00	$25.01	$1,397.07	$83,782.33
Well #2	$22,748.00	$35,394.00						320	LF	$35.74	$11,436.80	320	LF	$24.94	$7,980.80	$1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	50	LF	$15.38	$769.00	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$84,024.77
Well #3	$33,686.00	$48,103.00	400	LF	$32.26	$12,904.00	$531.39	500	LF	$35.74	$17,870.00	500	LF	$33.70	$16,850.00	$1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	40	LF	$15.38	$615.20	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$122,820.37
Well #4	$17,229.00	$19,408.00	400	LF	$32.26	$12,904.00	$531.59	500	LF	$22.47	$11,235.00	500	LF	$24.94	$12,470.00	$1,000.00	20	LF	$35.26	$705.20	$ 350.00	40	LF	$15.38	$615.20	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$65,772.77
Well #5*	$0.00	$20,183.00						300	LF	$35.74	$10,722.00	300	LF	$24.94	$7,482.00	$1,000.00	20	LF	$35.26	$705.20	$ 350.00	20	LF	$15.38	$307.60	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$43,510.17
Well #6	$17,229.00	$19,408.00	400	LF	$32.26	$12,904.00	$531.59	500	LF	$22.47	$11,235.00	500	LF	$24.94	$12,470.00	$1,000.00	20	LF	$35.26	$705.20	$ 350.00	20	LF	$15.38	$307.60	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$65,465.17
Well #7*	$0.00	$20,183.00						300	LF	$35.74	$10,722.00	300	LF	$24.94	$7,482.00	$1,000.00	20	LF	$35.26	$705.20	$ 350.00	20	LF	$15.38	$307.60	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07	$43,510.17
																																			Sum	$508,885.75

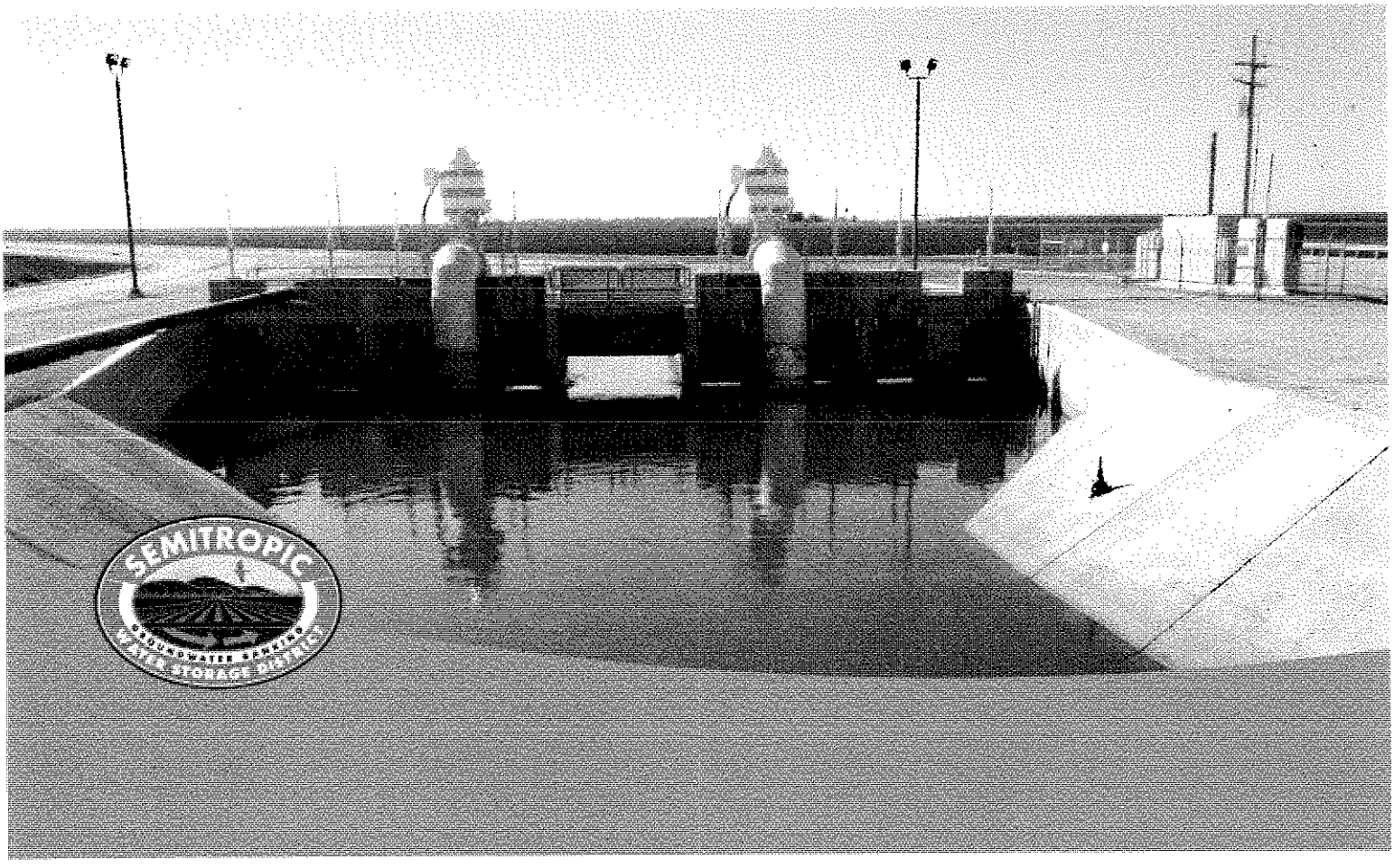
*Motor was purchased prior to this Grant and is in the District inventory.

Semitropic Water Storage District • 1101 Central Ave., PO Box 8043 • Wasco, CA 93280

Semitropic Water Storage District

Agricultural Water Management Plan

December 2015



Drought Management Plan

The Drought Management Plan details how the District would prepare for droughts and manage water supplies and allocations during drought conditions. Some components or actions may require review of conditions, policy changes, and long-term capital improvements. Additionally, as conditions change and new technology and knowledge becomes available, opportunities and constraints will change. The drought management plan describes the following components prescribed in the Guidebook:

1) ***What hydraulic levels or conditions (reservoir levels, stream flows, groundwater, snowpack etc.) are monitored and measured to determine the water supply available and level of drought severity.***

   The primary source of surface supply for the District is its allocation to SWP water through the Kern County Water Agency (KCWA), the local contractor with the SWP. Hydrologic conditions affecting supply and operations of the SWP are extensively monitored by DWR and used to forecast allocations to each of the project's contractors. These allocations then determine the quantity of SWP water available to the District.

Deliveries from the California Aqueduct into the Semitropic system are measured. In addition, groundwater elevations are extensively monitored by the District to support operation of Semitropic's conjunctive management and banking operations and for compliance with DWR's CASGEM program.

Determinations of drought severity as it applies to the SWP are developed by DWR. Data on groundwater elevations are used by the District to assess drought severity.

2) ***The district's policy and process for declaring a water shortage and implementing the water shortage allocation and drought management plan.***

Water supplies available from the SWP are governed by watershed precipitation, snow melt runoff and other hydrologic factors that affect the yield of the SWP. For SWP water, in any year when the District's water supply from the KCWA is less the total of the contract amounts for all water users, each Contract Water User is allocated a pro-rated share of the District's total water supply. The District may also supply a portion of the contract amount of water allocated to a particular water user from sources other than the KCWA, including water it returns as a delivery into the District from storage in banking projects located outside of the District.

During years when the availability of water from the SWP is limited, the District landowners increase reliance upon groundwater wells as part of the District's conjunctive management strategy. The District also recovers water from banking facilities that are located out of District. These facilities include the Pioneer Bank and the Kern Water Bank Authority.

3) ***Operational Adjustments – changes in district water management and district operations to respond to drought, including canal and reservoir operations and groundwater management.***

Figure 7 shows the annual SWP allocation for the District in a recent period from 2004-2015, shown in percent of SWP contract allocation, as an indicator of hydrologic conditions. The figure illustrates that in a in a "dry" year, surface water supplies can be very limited as in 2014 when the SWP supplied only 5 percent, which was 7,750AF to the District. Under these conditions, pumping from both District-owned-and-operated wells and from privately-owned wells is significant. By contrast, in a recent "wet" year such as 2011, surface water deliveries exceeded 500,000 AF, with over 350,000 AF absorbed within the District and over 150,000 AF delivered to banking facilities located outside of the District. The "wet" year deliveries contribute to satisfy irrigation water requirements within the contract, intermittent, and temporary service areas (and thereby minimize the use groundwater). The wet year surface water deliveries include District surface water supplies and surface water deliveries on behalf of water banking partners. The District's average Contract Amount of SWP water to lands within the Contract Service Area is 3.5 AF/acre.

During droughts, because surface water supplies available to the District are minimal, measures to improve management of surface water through canal and reservoir operations have limited effectiveness. The District's response to dry conditions has been

to exercise conjunctive management by increasing extraction of groundwater from privately-owned wells to compensate for reduced deliveries of surface water. The District also call upon outside banking facilities to bring in water previously stored in the Kern Water Bank Authority and Pioneer Bank.

Due to its length and severity, the current drought has compelled the District to implement drought response measures that go beyond conjunctive management. In particular the District has 1) severely pro-rated allocations; and 2) implemented a land retirement program under which the District has purchased farm land for conversion to other land uses which do not require irrigation.

In addition to the drought response measures undertaken by the District, individual land-owners within the District service area have been actively managing land, water and other resources to minimize drought-induced impacts on their farming operations.

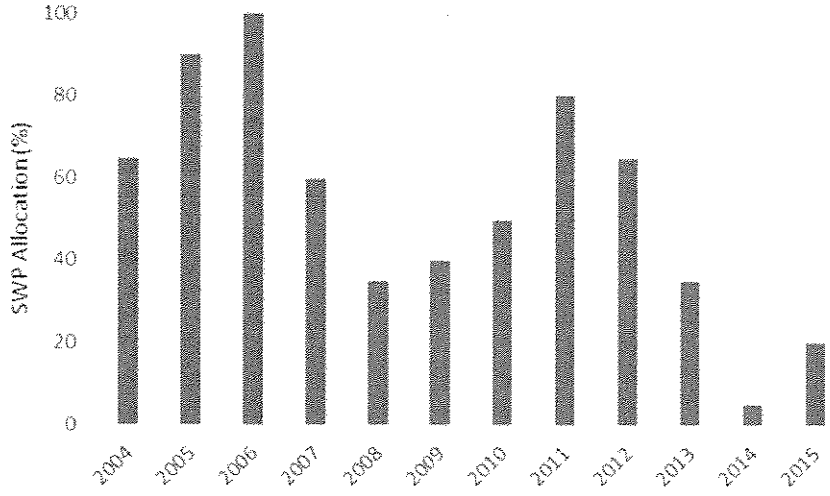


Figure 7. Annual State Water Project Allocations in Percent for 2004 - 2015

4) ***Demand Management – policies and incentives in addition to the water shortage allocation plan to lower on-farm water use.***

The District's primary program for demand management has been purchase of farm land for conversion to other purposes. However, for the most part, rather than instituting district-governed policies and incentives to lower on-farm water use, the District's approach to demand management has been largely to provide the high degree of flexibility and responsiveness in deliveries necessary to enable growers to manage water efficiently under all conditions. These practices include use of district-owned conveyance facilities to transfer water among common landowners within the service area.

The District also provides clear estimates of water allocations so that growers can make well-informed farming decisions. The level of operational responsiveness provided by the District together with early projections of water allocations are particularly crucial

during droughts when farmers must make challenging decisions on how best to manage their farmland including decisions on planting and on allocation of water among established crops.

5) ***Alternative Water Supplies – discuss the potential if possible for the district to obtain or utilize additional water supplies. These supplies could include transfers from another water agency or district, the use of recycled water and desalination of brackish groundwater or drainage water.***

As previously mentioned, the District's principal source of surface water is its allocation of SWP water. In addition, the District can gain access to supplemental supplies of water, including water from the CVP and the Kern River, through exchanges and water purchases. Due to the conditions of reduced reliability of SWP water, prior to and during the drought, the District has initiated water supply development programs to enhance surface water supplies through water purchases and transfers. However, available supplies to purchase or transfer have been very limited during this extended drought. Throughout the drought, the District has adhered to its fundamental strategy of relying on groundwater recharged during wet years to serve as a reservoir that could be drawn upon during dry periods to satisfy demands within the District's service areas.

6) ***Stages of Actions – includes the stages of action and corresponding levels of drought severity that district will implement in response to the drought.***

Drought response in the District is a responsibility shared by the District and its growers. The District's drought response policies are intended to allocate available surface water, augmented by water recovered from the Districts outside banking facilities and privately-owned wells, in a manner that is equitable and consistent with the District's operational policies while maintaining the District's financial viability. An important objective of this approach is to provide growers with an accurate assessment of the volume and cost of water that will become available to them so they can utilize this water in a manner that is best suited to the requirements of their farming operations.

Because the quantity of SWP water available to the District in any given year is beyond the District's control, the District's drought response measures center on managing groundwater and idling land. Reduced allocations of District-supplied water have placed the responsibility of managing these reduced supplies on growers to determine how best to utilize limited water supplies through deficit irrigation, fallowing of annual crops and other water conservation measures.

7) ***Coordination and Collaboration – include a description of how coordination and collaboration with other local districts and water agencies or regional groups will be used in drought response.***

The Poso Creek Regional Water Management Group (RWMG) has proven itself to be an effective organization for operational coordination and for collaboration on development of water conveyance and groundwater management projects. These projects have enabled the District to expand its capacity to recharge the local aquifer and to return banked water to banking partners. From a regional perspective, the projects have

improved the ability to distribute water within the region and increased the capability of the RWMG's members to exchange and transfer water for irrigation application and for groundwater recharge. In addition to developing projects, the RWMG has been successful in obtaining state and federal funding for implementation of projects, all of which have improved regional resiliency to drought.

Implementation of the Sustainable Groundwater Management Act (SGMA) will provide yet another mechanism for regional collaboration and coordination. Regional efforts to implement this legislation will provide a firm, cooperative basis for management of groundwater during all conditions, but will be particularly important as a tool for drought response.

8) ***Revenues and Expenditures – describes how the drought and lower water allocations will affect the district's revenues and expenditures.***

The Semitropic Board of Directors annually establishes a water allocation (which is applied per Contracts as described at Section B4as well as a General Project Service Charge (GPSC) which is also applied on a per-acre basis and is based on budget requirements and Board policy as limited by Proposition 218. The GPSC is structured to collect a significant portion of the District's fixed annual capital obligations relative to the District project which includes importation of surface water and the necessary conveyance facilities.

Because SWP water is delivered into the District's distribution system by gravity, the cost of distributing surface water in the pressurized distribution system is not closely tied to annual hydrology as most of the District's distribution cost is attributable to the fixed costs of operating and maintaining the canal system. By contrast, the costs to the District, as well as to private well owners, of increased groundwater pumping are substantial both because of the greater volumes of groundwater pumped during droughts and because the cost of pumping each unit of water increases as groundwater elevations decline.

The GPSC is a fixed revenue stream collected on each acre within the Semitropic Improvement District receiving District Surface Water or developed with reliance upon groundwater.

In Dry years the District does not benefit from water sales revenue and must rely upon the revenue from the GPSC and the revenue from the bank recoveries on behalf of its banking partners.

In wet years the District receives revenue from water sales along with revenue received from the District banking partners when depositing water into storage. Excess revenue generated during the wet years is placed into reserve accounts. These reserve accounts are accessed in dry years to mitigate the impact of decreased revenue from water sales. In 2013 the District increased the GPSC by $100 per developed acre to improve the ability of the District to fund reserves as well as to provide a funding mechanism for creation of additional water supply programs.