ORIGINAL

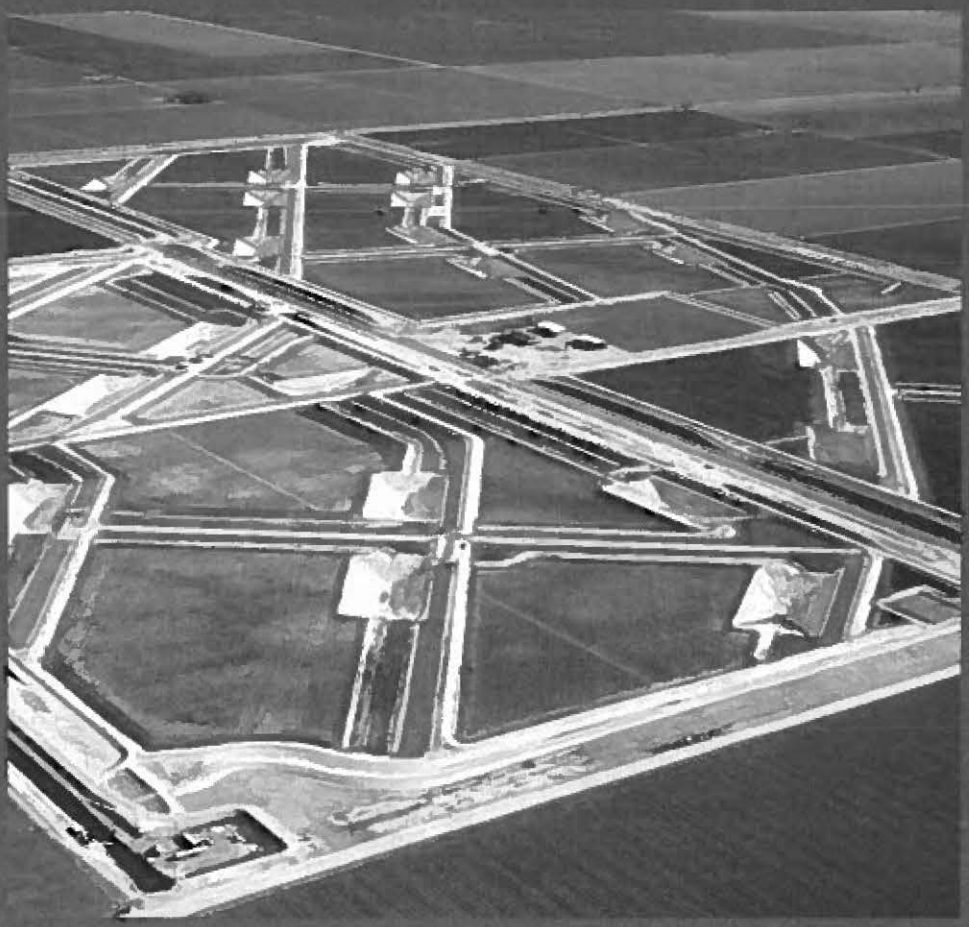
June 25, 2015

WaterSMART: Drought Resiliency Project Grants
FY 2015
Funding Opportunity No. R15AS00046

Groundwater Well Extraction Improvements for Return of Stored Water

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

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



OMB Number: 4040-0004
Expiration Date: 8/31/2016

Application for Federal Assistance SF-424

* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
☐ Preapplication	☒ New	
☒ Application	☐ Continuation	* Other (Specify):
☐ Changed/Corrected Application	☐ Revision	

* 3. Date Received:	4. Applicant Identifier:
06/25/2015	

5a. Federal Entity Identifier:	5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:	7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name:	Semitropic Water Storage District
* b. Employer/Taxpayer Identification Number (EIN/TIN):	95-6006599
* c. Organizational DUNS:	6150718260000

d. Address:

* Street1:	1101 Central Avenue
Street2:	P.O. Box 8043
* City:	Wasco
County/Parish:	Kern
* State:	CA: California
Province:	
* Country:	USA: UNITED STATES
* Zip / Postal Code:	93280-0877

e. Organizational Unit:

Department Name:	Division Name:
Engineering	Semitropic Water Storage Distr

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:	Mr.	* First Name:	Paul
Middle Name:			
* Last Name:	Oshel		
Suffix:			

Title:	District Engineer
Organizational Affiliation:	Semitropic Water Storage District
* Telephone Number:	(661)758-5113
Fax Number:	(661)758-3219
* Email:	mail@semitropic.com

JUN 25 '15 PM12:11

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

D: Special District Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

U.S. Dept. of Interior, Bureau of Reclamation, Policy Admin

11. Catalog of Federal Domestic Assistance Number:

15.514

CFDA Title:

WaterSMART: Drought Resiliency Project Grants for Fiscal Year (FY) 2015

*** 12. Funding Opportunity Number:**

FOA R15AS00046

* Title:

WaterSMART: Drought Resiliency Project Grants for Fiscal Year (FY) 2015

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Groundwater Well Extraction Improvements for Return of Stored Water

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: 22Kern
* b. Program/Project: 22Kern

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2015
* b. End Date: 09/30/2016

18. Estimated Funding ($):

* a. Federal	300,000.00
* b. Applicant	661,695.00
* c. State	
* d. Local	
* e. Other	
* f. Program Income	
* g. TOTAL	961,695.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☒ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:	Mr.
* First Name:	Paul
Middle Name:	
* Last Name:	Oshel
Suffix:	
* Title:	District Engineer
* Telephone Number:	(661)758-5113
Fax Number:	(661)758-3219
* Email:	mail@semitropic.com
* Signature of Authorized Representative:	Paul Oshel Paul Oshel District Engineer
* Date Signed:	6-22-15

ASSURANCES - CONSTRUCTION PROGRAMS

OMB Number: 4040-0009
Expiration Date: 06/30/2014

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant:, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progressive reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards of merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681 1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29) U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statue(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statue(s) which may apply to the application.

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.

14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

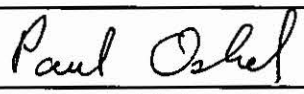
16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq).

18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

20. Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
Paul Oshel 	District Engineer
APPLICANT ORGANIZATION	DATE SUBMITTED
Semitropic Water Storage District	06/25/2015

SF-424D (Rev. 7-97) Back

Semitropic Water Storage District

Groundwater Well Extraction Improvements for Return of Stored Water

WaterSMART: Drought Resiliency Project Grants (FY 2015):
Funding Opportunity Announcement No. R15AS00046

Project Location

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

Semitropic Water Storage District

1101 Central Avenue
P.O. Box 8043
Wasco, CA 93280-0877

Project Manager: Paul Oshel
Email: mail@semitropic.com
Phone: (661) 758-5113
Fax: (661) 758-3219

June 25, 2015

2.0 TABLE OF CONTENTS

3.0 Technical Proposal and Evaluation Criteria

3.1 Executive Summary (Applicant information)

Date	June 24, 2015
Project Name	Groundwater Well Extraction Improvements for Return of Stored Water

Applicant Information	
Name	Paul Oshel
Title	District Engineer Semitropic Water Storage District
Telephone	(661) 758-5113
E-mail Address	mail@semitropic.com
City, County, State	Wasco, Kern, California

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* (Project) proposes drought resiliency for in-District and external users by equipping nine 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 $961,695. Of this total, $300,000 is requested Federal funding.

3.1.1 Project Quantification

The Project is estimated to provide the following annual benefits, in acre-feet. Technical justifications for each of these values are given in Sections 3.3 and 3.4.

Avg. Annual District Water Supply	448,612 AF
Est. Annual Water Saved[1]	14,400 AF
Est. Annual Water Better Managed[2]	2,880 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.

3.1.2 Project Duration and Completion Date

The Project is to be completed within one year of signing a grant agreement (latest September 30, 2015). Construction activities are expected to be performed within four months and Project completion date to be no later than September 30, 2016. Time allotted for project

activities are based on recent experience by District staff in completing the design for this work. The District will perform construction management services.

3.1.3 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.

3.1.3 Project Funding

The District requests the following funding support from the Reclamation to implement the Project. A budget and justification for the funding assessment are given in Section 9.0.

Funding Source	Funding Amount
Non-Federal Entities (District)	$661,695
Reclamation Funding	$300,000
Total Project Funding	$961,695

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 nine 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 the Kern River, CVP via the Friant-Kern Canal with water moved to the District via CVP contractors, and water delivered to the District as part of their Banking Program.

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:

Water Supply	Annual Contracted Allocation (AF)	Avg. Annual Deliveries (AF)	Anticipated Future Annual Deliveries (AF)
State Water Project (SWP)	155,000[1]	108,196[2]	94,550[3]
Central Valley Project (CVP)	0[4]	0	As available.[4]
Kern River	0[5]	< 1,500	As available.[5]
Poso Creek[6]		< 500	As available.[6]
Other Water Deliveries[7]		56,560	56,560[7]
Groundwater Resources[8]	Not applicable.	296,986	296,986[8]
Water Bank Exchanges[9]	Not applicable.	(13,130)	(13,130)[9]
Total[10]	155,000	448,612	434,966

[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] Anticipated 61 percent reliability of SWP water supplies, from the SWP Water Supply Reliability Report (DWR, 2012). 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.

[4] 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.

[5] The District is not a contractor for Kern River water supplies, however, occasionally receives diversions courtesy of the KCWA.

[6] 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.

[7] Includes all water supplies and transfers into the District as part of the Banking Program, as part of water entitlement exchange with banking partners' water left in California Aqueduct system.

[8] 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, 2014).

[9] Water supplies delivered to out-of-District water banking facilities (negative values indicate water deposited into facilities rather than withdrawn). Does not specify which previous water types (i.e., SWP supplies) were deposited, only that a certain portion of the water supplies were exchanged.

[10] Totals based on District measurements and approximations (SWSD, 2014). 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 following figure illustrates the Water Banking Process followed by the District:

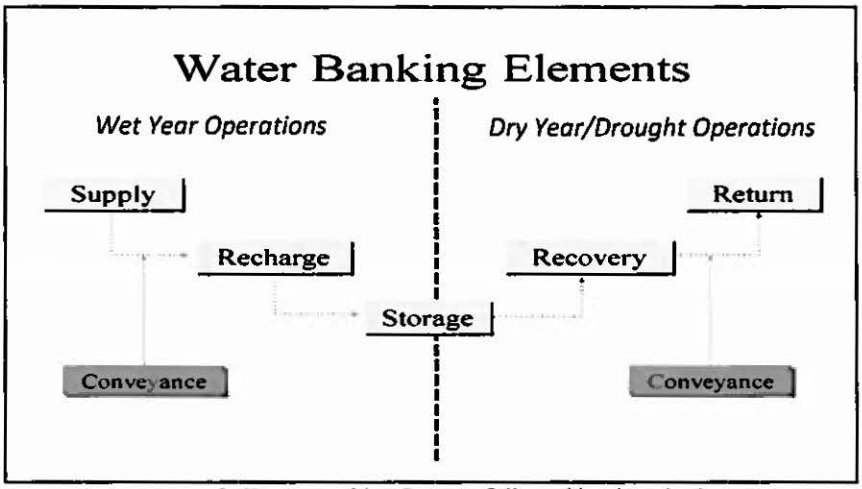


Figure 3: Water Banking Process followed by the District

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 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.

3.2.3 Water Conveyance and Delivery System

The District's canal and pipeline distribution systems and related works were completed in 1973. Additional features and enlargements (e.g., pumping stations, canal check structures, and spreading basins) were constructed and expanded 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 AF capacity 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 particularly 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 Facility. 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 Pond-Poso spreading ponds 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

44 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 31 percent). Using estimate ETc values, and an assumption for irrigation leaching requirements, agricultural water usage accounts approximately 478,500 AF per year in the District (95 percent of total usage) (SWSD, 2014). By comparison, other water uses and outflows, such as groundwater recharge, conveyance seepage and evaporative losses, and limited environmental uses account for an estimated 18,860 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.

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 of this special study.

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. In this regard, the IRWM Group worked with Reclamation to prepare an Environmental Assessment (EA) to cover long-term banking and exchange activities among neighboring districts in the Poso Creek IRWM Plan Area

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 was substantially completed in 2014, with the exception of 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.

2013: The District, in partnership with neighboring water district, Shafter Wasco Irrigation District, entered into a grant agreement with Reclamation (Agreement No. R13AF20008) for the San Joaquin River Restoration Program for the Madera Avenue Intertie Project.

2015: Recently 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). That project is for the installation of a groundwater well operation data acquisition and solar power energy upgrade.

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 is to equip nine wells (eight existing deep wells and one shallow well) 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 86,400 acre-feet over the 30-year life of the project, equal to 2,880 acre-feet annually when normalized over that time period (following logic explained in Section 3.4.1).

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 the end of September 2016.

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. *Expected 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. *Expected 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. *Expected 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. As mentioned in Section 4.0, Reclamation will evaluate the Area of Potential Effects of the Project and determine the level of environmental documentation required. *Expected Deliverables*: Coordinate with Reclamation on completion 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. *Expected Deliverable*: Complete necessary permitting/approval activities prior to construction activities.

Task 6: Equipment Procurement - Equipping of the wells will primarily be completed by District field staff. The District has selected one contractor, Chuck Akins, to assist in welding for pump discharge. The work under this task will include as follows: identification of equipment to be purchased; request quotes from vendors; evaluate quotes and issue Purchase Orders; coordinate delivery of equipment. *Expected Deliverables*: Finalize component lists for well equipment. Prepare solicitation packages. 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 Akins under contract with the District. *Expected Deliverables:* Reference Construction Management task below.

Task 8: Construction Administration - This task is simplified in that the District Staff will perform all construction administration. *Expected 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

Long Term Resiliency to Drought:

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.

Quantified Water Supply:

With implementation of the Project, the groundwater *Recovery* capacity of the nine wells would be around 60 acre-feet/day, based on a pumping estimate of 6.67 acre-feet/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 1,800 acre-feet/month (60 acre-feet/day x 30 day/month), or 14,400 acre-feet during a typical 8-month recovery operation (1,800 acre-feet/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 14,400 acre-feet annually during a dry year or drought conditions prompting recovery operations (see Section 3.2.2 for description of *Recovery* of banked water supplies during dry years).

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 for banked water supplies or groundwater usage is lower (SWSD, 2013). Based on typical banking *Recovery* operations and rough District guidelines, 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 Draft 2015 SWP Delivery Capability Report (DWR, 2015), historical annual SWP allocation percentages were analyzed using 2015 condition modeling techniques for the years 1922 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 nine 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 86,400 AF of banked water supplies (14,400 acre-feet x 6 years) could potentially be recovered over the 30-year life period. Normalized over 30-years, the result is approximately 2,880 acre-feet annually (86,400 AF / 30 years).

Additionally, 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 2,880 AF of normalized annual pumping from the underlying aquifer makes an equivalent 2,880 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, the 2,880 acre-feet annually mentioned above, 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).

Water Better Managed:

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 86,400 acre-feet over the 30-year life of the project, equal to 2,880 acre-feet annually when normalized over that time period (following logic above).

Quantified Water Management:

The estimated total water recovered by the proposed Project is based on the additional 14,400 acre-feet per wet period year of recovery capacity of the Facility. As stated above, per the frequency of banking *Recovery* years this equates to approximately 86,400 acre-feet of returned banked water supplies over the 30-year life (2,880 acre-feet normalized annually, occurring approximately 6 out of every 30-years). Thus, the amount of water expected to be better managed through implementation of this Project is equal to the recovered water. "Water better managed" in this context refers to increased water supplies through better management and increased pumping capabilities of the District's Banking Program.

Well Benefits:

Estimated Capacity and Extraction of Wells:

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 simple 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 nine equipped wells, the recovery capacity from the underlying aquifer would be around 60 acre-feet per day (6.67 acre-feet/day x 9 wells). As stated above, for an average month (30-days) the recovery capacity would be around 1,800 acre-feet/month (60 acre-feet/day x 30 days), or 14,400 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 86,400 acre-feet of returned banked water supplies over the 30-year life (14,400 acre-feet/year x 6 years), or 2,880 acre-feet per year normalized over the life of the Project (86,400 acre-feet / 30 years). Thus the amount of water extraction anticipated from installation of this Project, on an equivalent yearly basis, is 2,880 acre-feet.

Supplemental Supply In Lieu of Surface Water 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 refilling 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).

No Adverse Impact to Aquifer:

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	2007-1-P	957	32	18	Steel/PVC
2	2008-13-P	965	32	18	Steel/PVC
3	2008-14-P	957	32	18	Steel/PVC
4	2008-15-FP	937	32	18	Steel/PVC
5	2008-16-FP	957	32	18	Steel/PVC
6	2008-17-FP	982	32	18	Steel/PVC
7	2008-30-FP	917	32	18	Steel/PVC
8	2009-32-FP	924	32	18	Steel/PVC
9	2008-22-S	360	32	18	Steel/PVC

Groundwater Monitoring Plan

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.

Endangered or Threatened Species:

ESA Conservation or Recovery Plan:

Any water conveyed south of the Bay-Delta involves pumping constraints that are in place to support endangered and threatened species. 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. The San Joaquin River Restoration Program is focused on the goal of reducing or avoiding adverse water supply impacts from long-term Federal water supply (CVP) contractors receiving water along the Friant-Kern Canal (along the eastern-side of the Southern San Joaquin Valley). These restoration efforts include a recirculation program where flows from the San Joaquin River are conveyed through the Bay-Delta, eventually picked up and conveyed south via the California Aqueduct. As such, recirculation water may be managed with the assistance of the District's banking facilities for neighboring districts. The following species are native to the primary surface water supplies conveyed to Northern Kern County:

With regard to the San Joaquin River, relevant endangered species, per the federally-recognized candidate listing, include the following:

1. Chinook Salmon: Federally threatened (spring runs) and endangered (winter runs).

With regard to the Bay-Delta, relevant endangered species, per the federally-recognized candidate listing, include the following:

1. Delta Smelt: Federally endangered. December through June pumping restrictions along California Aqueduct.
2. Longfin Smelt: Candidate. December through January pumping restrictions along California Aqueduct.
3. Chinook Salmon: Federally threatened (spring runs) and endangered (winter runs). October through June pumping restrictions along California Aqueduct.

The State has also formed a set of co-equal goals, as defined in the Amended Memorandum of Agreement Regarding Collaboration on Planning, Design and Environmental Compliance for the Delta Habitat Conservation and Conveyance Program in Connection with the California Bay Delta Conservation Plan, to provide reliable water supply for California while enhancing, protecting, restoring, and enhancing the Bay-Delta ecosystem and habitat for the aforementioned species (SB1, Steinberg- Section 85054). Pumping restrictions on water conveyed south of the Bay-Delta, thereby reducing the reliability of water delivered to the District, are currently being implemented in the Bay-Delta in an effort to restore the populations of these species, as noted above.

Species Status Improvement:

The proposed Project would indirectly benefit federally-listed threatened or endangered species by improving the regulation of water supplies that have been rendered less reliable owing to the imposition of measures designed to protect threatened and endangered species. These measures include seasonal pumping restrictions in the Sacramento River-San Joaquin River Delta (Delta) and restoration of flows below Friant Dam on the San Joaquin River. The pumping restrictions reduce the amount and constrain the timing of deliveries of SWP and CVP water pumped from the Delta and the deliveries of CVP-Friant Division supplies. The District and neighboring districts have contracts for water from both of these sources; projects that provide flexibility in timing of surface water deliveries provide some relief for environmental water management, thus improving habitat conditions.

The proposed project assists with water banking operations that improve the availability of stored water, which help align the timing of available supplies with demands. If the available surface supply is put into groundwater storage and later returned to meet high environmental demands, then some benefit may occur that help improve the status of a species.

3.4.2 Evaluation Criterion B – Drought Planning and Preparedness

The District has not filed a drought plan with either Reclamation or the California Department of Water Resources (DWR). To the extent that the District has identified potential impacts from perennial or long-term dry conditions, notably resulting from the effects of climate change, 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 2013 Agricultural Water Management Plan (AWMP) submitted to and approved by the DWR. 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.

It is worth noting that one of the District's major groundwater banking partners, the Metropolitan Water District of Southern California (MWD) has completed a drought plan in 1999. 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). Both agencies are principally urban water supplies located south of the District's service area, in and near the city of Los Angeles. In short, both plans address extraction and conveyance improvements for the return of stored water to the respective agencies, as projects and efforts that can provide regional drought preparedness and increase their water supply reliability. 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. More information on drought contingency planning is covered in Section 5.0.

Drought Plan Stakeholders:

Since both MWD and CLWA are principally urban water suppliers, both of their drought plans address how to more effectively acquire water supplies for their users during dry years and drought conditions. These plans also focus on the storage of surface water supplies during periods of excess availability (e.g., wet hydrologic years) or when demands are such that operations allows for the storage of water.

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.

Much of CLWA's drought impact planning and management has been completed by the agency and regional users. As mentioned above, the document that 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 Urban Water Management Plan (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.

Consideration of Climate Change Impacts:

As mentioned above, the District addressed this issue in their 2013 AWMP (SWSD, 2014) 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.

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

Drought Conditions:

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 under either 'Extreme Drought (D3)' or '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. In most of the region, these drought conditions are borderline short and long-term impacts, meaning around or greater than 6 month impacts. The latest release of this information was June 9, 2015. 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).

Severity of Drought in Response to Climate Change:

Impacts on the region regarding surface water supplies are largely dictated by changes in the volume, nature, and timing of precipitation in watersheds, where water can be adequately 'captured' and diverted to areas of need or stored for times of need. 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, which directly affects the water volume supplied to Semitropic, includes those potential 'excess' volumes which could be stored and recharged as groundwater supplies.

A study of the possible effects of climate change to surface and groundwater sources in the Central Valley was conducted by the *USGS California Water Science Center* (CAWSC). In this study (USGS 2009), models were used to quantify the hydrological effects of warming climate scenarios including a model of runoff and recharge from the watersheds of the Sierra Nevada Mountains and a model of agricultural water deliveries and use in the Central Valley. These scenarios were based on a commonly accepted projection of 21st century climate from the GFDL CM2.1 (Geophysical Fluid Dynamics Lab Climate Model 2.1) global climate model, responding to assumptions of rapidly increasing greenhouse-gas emissions. The scenarios predict California's climate as becoming warmer (+2 to +4° C) and drier (10-15 percent) during the mid- to late-21st century, relative to historical conditions.

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 the reduced base flow in streams, reduced groundwater outflows, increased depths to groundwater, and increased land subsidence. These combined effects have the potential to allow the District to rely more on groundwater to supplement years where surface supplies are inadequate to meet demand.

Drought Impacts as a Result of No Action:

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 2014 AWMP (SWSD, 2014), 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.

Public Health or Social Concerns:

Many of the communities in the surrounding region are considered "economically disadvantaged communities" (DACs) based on a comparison of the statewide median household income ($60,883 for 2006-2010 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.

Economic Losses:

While most of the District's water use for agricultural purposes, there are 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, but are not limited to, 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, such as from Reclamation project water to regional agencies, the reliance on other sources of supplies becomes more pronounced.

Regarding banking partners, 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. In that regard, this Project can provide a more reliable source of supply for these areas as well.

Environmental Impacts:

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. If no action is taken (i.e. no improvement of recovered water commences to allot necessary water to banking partners and leave adequate supplies in the Bay-Delta or San Joaquin River for fish restoration), the population and status of the special status fish listed in Section 3.4.1 in the San Joaquin River and Bay-Delta will continue to decline.

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.

Other Drought-Related Impacts:

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. Further, 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.

3.4.4 Evaluation Criterion E – Nexus to Reclamation

Connection to Reclamation or Project Activity:

Though the District is not a long-term CVP contractor of Reclamation-managed water supplies, it has received multiple USBR grant awards (listed in Section 3.2.6) and 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? No.

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 from a number of sub-basins in and around Northern Kern County. As mentioned above, 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. In that regard, the proposed Project and related Facilities are located in the same basin as Reclamation project and CVP contractor activities. Moreover, the Friant-Kern Canal System extends north-south with the same basin located to the east of the District's service area. To the extent that the District monitors and evaluates groundwater movement, as part of the banking program and recharge efforts, there is no disruption of local CVP contractor or Reclamation activities. The District actively utilizes their conveyance infrastructure and connection to the DWR-managed California Aqueduct for conveyance supplies between the Facilities and for fulfilling banking *Recovery* and *Return* for certain Banking Partners as explained in Section 3.3.1.

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

As mentioned above, the Project will contribute to the temporary holdover of water supplies (i.e., banking *Recharge* and *Return*) in a basin where a Reclamation project and activities are located.

Will the project help Reclamation meet trust responsibilities to any tribe(s)?

There are no tribal areas in the immediate area of Northern Kern County. As such, the assumption is that the Project will not be able to help Reclamation meet any trust responsibilities.

3.4.5 Evaluation Criterion F – Project Implementation

Project Implementation Plan

The Project will be implemented as follows: Activities would begin around October 1, 2015; design is complete; construction would be completed by the end of December 2015; and all project work and reporting would be completed by September 2016. 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. A Final Report will be addressed comments. The report shall be prepared and presented in accordance with the provision of grant contract. A Microsoft Project Schedule estimating the phases and milestones for completion of the work is shown in Appendix A.

Required 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.

Engineering Design Work:

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

New Policies or Administrative Actions:

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.

3.5 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 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 as a result of the Project will be presented in both energy (kWh/acre-foot) and water flow units (i.e., groundwater depth, as the assumption is that greater depths to groundwater require more energy to pump).

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. In essences, the increased *Return* capacity of the pumps during dry years and drought conditions provides proof 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 Project, "Groundwater Well Extraction Improvements for Return of Stored Water," is 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. It is expected that this EA will cover the proposed activities under this Project and that all environmental clearances are in place. 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

Semitropic Water Storage District has significant groundwater recharge and water banking capability. In this regard, the District manages a very large water banking project that began implementation in the mid-1990s. Today, the permitted groundwater storage capacity is 1.6 million acre-feet. The Groundwater Banking Program (Program), a long-term water storage project, is designed to store and return, or regulate, water resources for the District's Banking Partners. The proposed Project will assist in drought resiliency for Banking Partners by providing access to higher return of stored water to meet the needs of its Banking Partners. 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. Attached is MWD's Drought Management Plan, which points to drawing on the District's storage as one of its main drought actions.

Castaic Lake Water Agency (CLWA), also a Banking Partner, holds both a short-term and long-term storage program with the Semitropic Banking Program. Attached are relevant pages from CLWA's 2010 Urban Water Management Plan (UWMP), which lays out its historic storage and recovery activities in the Banking Program and notes that in times of drought, CLWA may face competition and limited access to needed water. The project would help alleviate the "competition" and provide for access of higher returned water. The UWMP also

explains the water available to Valencia Water Company 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 project. The well extraction improvements anticipate potential return of stored water for banking partners.

The District has received letters of support from the following neighboring water agencies:

- ✓ North Kern Water Storage District
- ✓ Shafter-Wasco Irrigation District (CVP-Friant contractor)
- ✓ Kern-Tulare Water District

Copies of the letters of support are included in Appendix D.

8.0 Official Resolution

The following page contains the Official Resolution for adoption by the District's Board of Directors, in support of filing an application with the USBR for a grant under the *WaterSMART: Drought Resiliency Project Grants.* This Resolution is scheduled for adoption at the District's July 8th Board Meeting. A copy of the signed Resolution will be provided following the Board Meeting.

9.0 Project Budget

9.1 Funding Plan and Letters of Commitment

The District's cost-match portion will be covered by the District's general engineering account, and, if needed, their reserve account. The District identified the Reserve Fund for 2015

View Burden Statement

OMB Number: 4040-0008
Expiration Date: 06/30/2014

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ 3,085.00	$	$ 3,085.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 0.00	$	$ 0.00
3. Relocation expenses and payments	$ 0.00	$	$ 0.00
4. Architectural and engineering fees	$ 1,380.00	$	$ 1,380.00
5. Other architectural and engineering fees	$ 5,084.00	$	$ 5,084.00
6. Project inspection fees	$ 0.00	$	$ 0.00
7. Site work	$ 0.00	$	$ 0.00
8. Demolition and removal	$ 0.00	$	$ 0.00
9. Construction	$ 938,773.00	$	$ 938,773.00
10. Equipment	$ 0.00	$	$ 0.00
11. Miscellaneous	$ 13,373.00	$	$ 13,373.00
12. SUBTOTAL *(sum of lines 1-11)*	$ 961,695.00	$	$ 961,695.00
13. Contingencies	$	$	$
14. SUBTOTAL	$ 961,695.00	$	$ 961,695.00
15. Project (program) income	$	$	$
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 961,695.00	$	$ 961,695.00

FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 31 %	$ 300,000.00

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), 2012. "The State Water Project: Final Delivery Reliability Report 2011."

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."

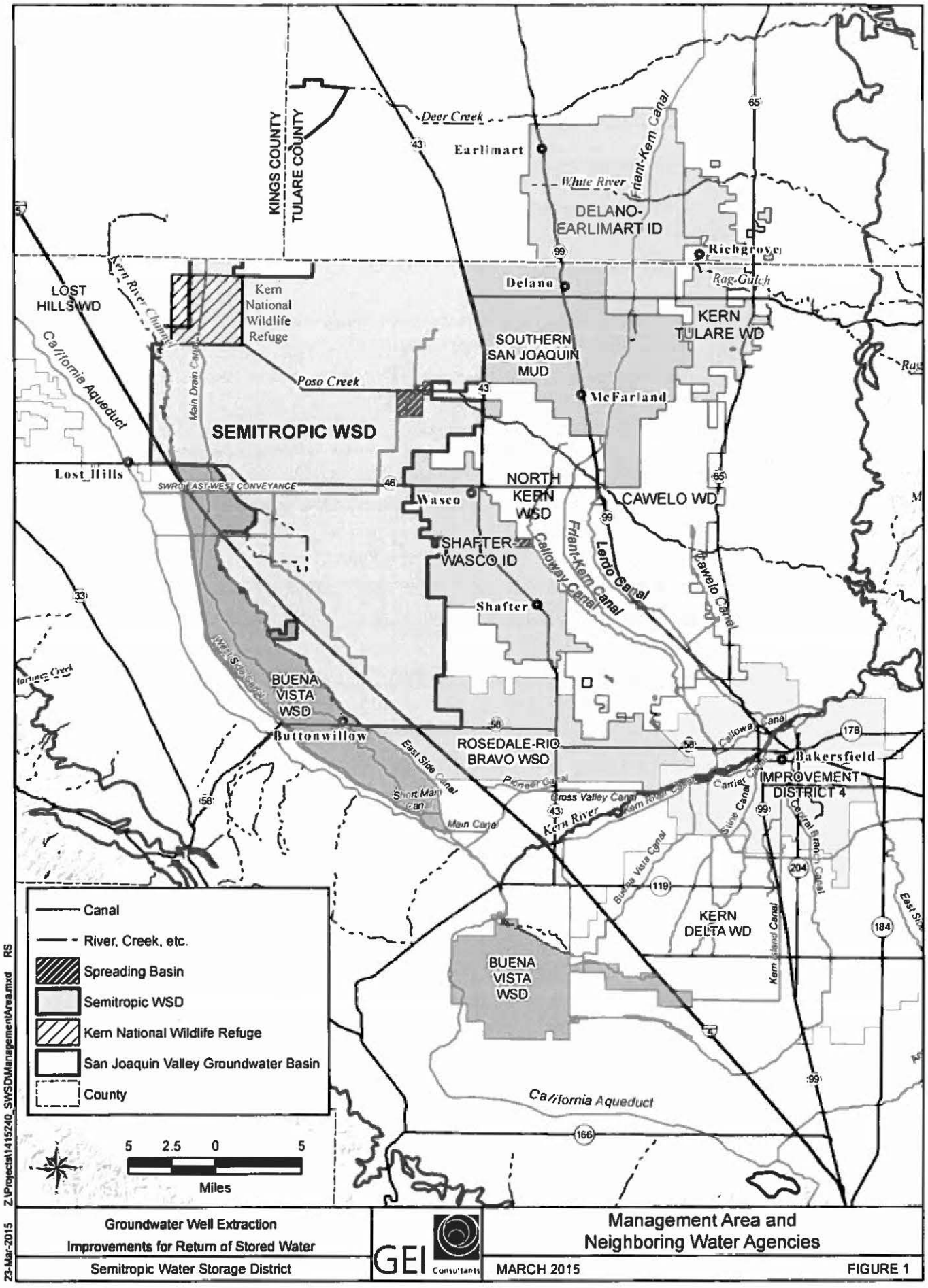
Semitropic Water Storage District (SWSD), 2014. "2013 Agricultural Water Management Plan (AWMP)." Board of Directors adopted December 11, 2013. Resolution No. ST 13-12.

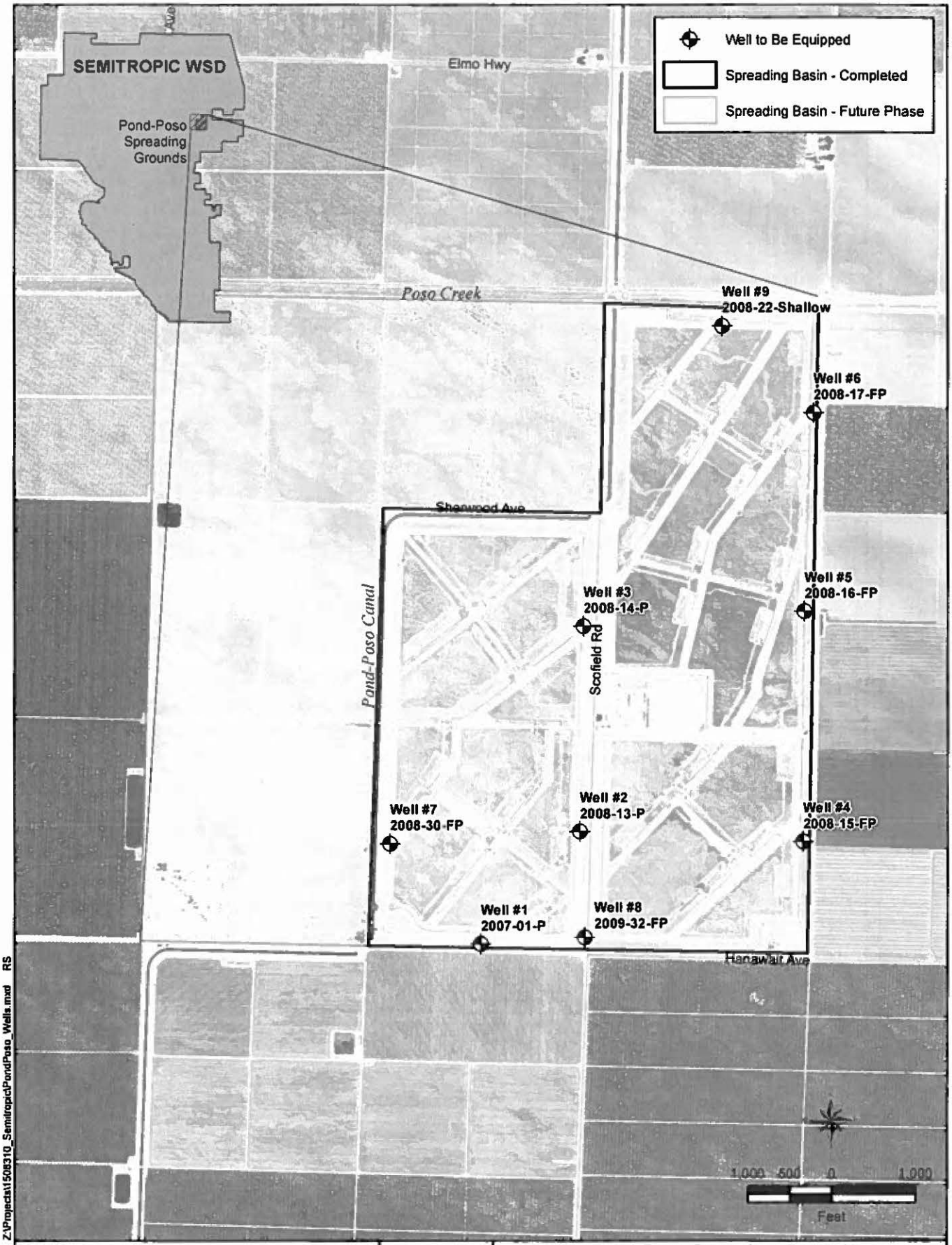
Semitropic Water Storage District (SWSD), 2012. "2012 Groundwater Management Plan (GWMP)." Board of Directors adopted 2012.

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".

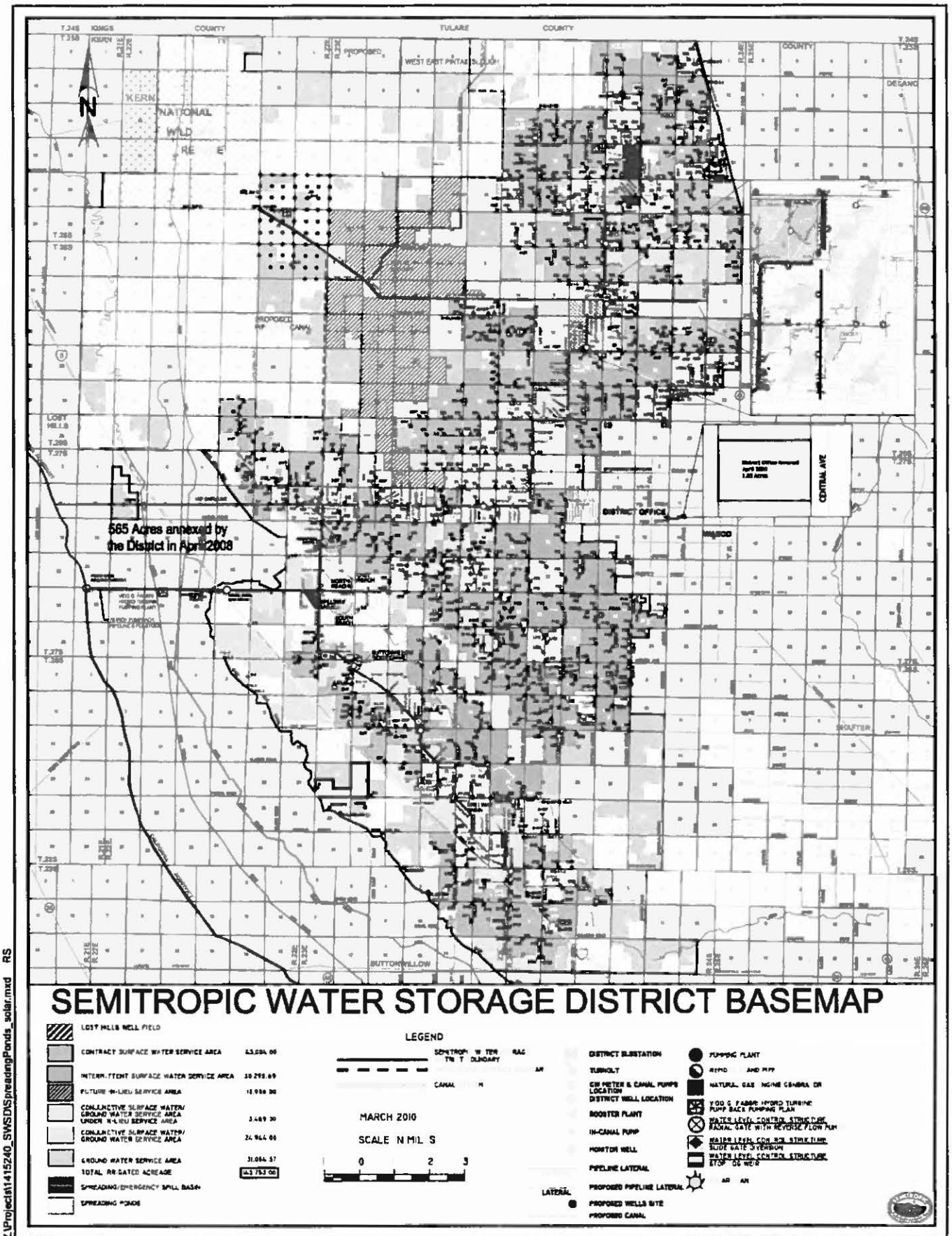
Appendix A - Proposal Figures





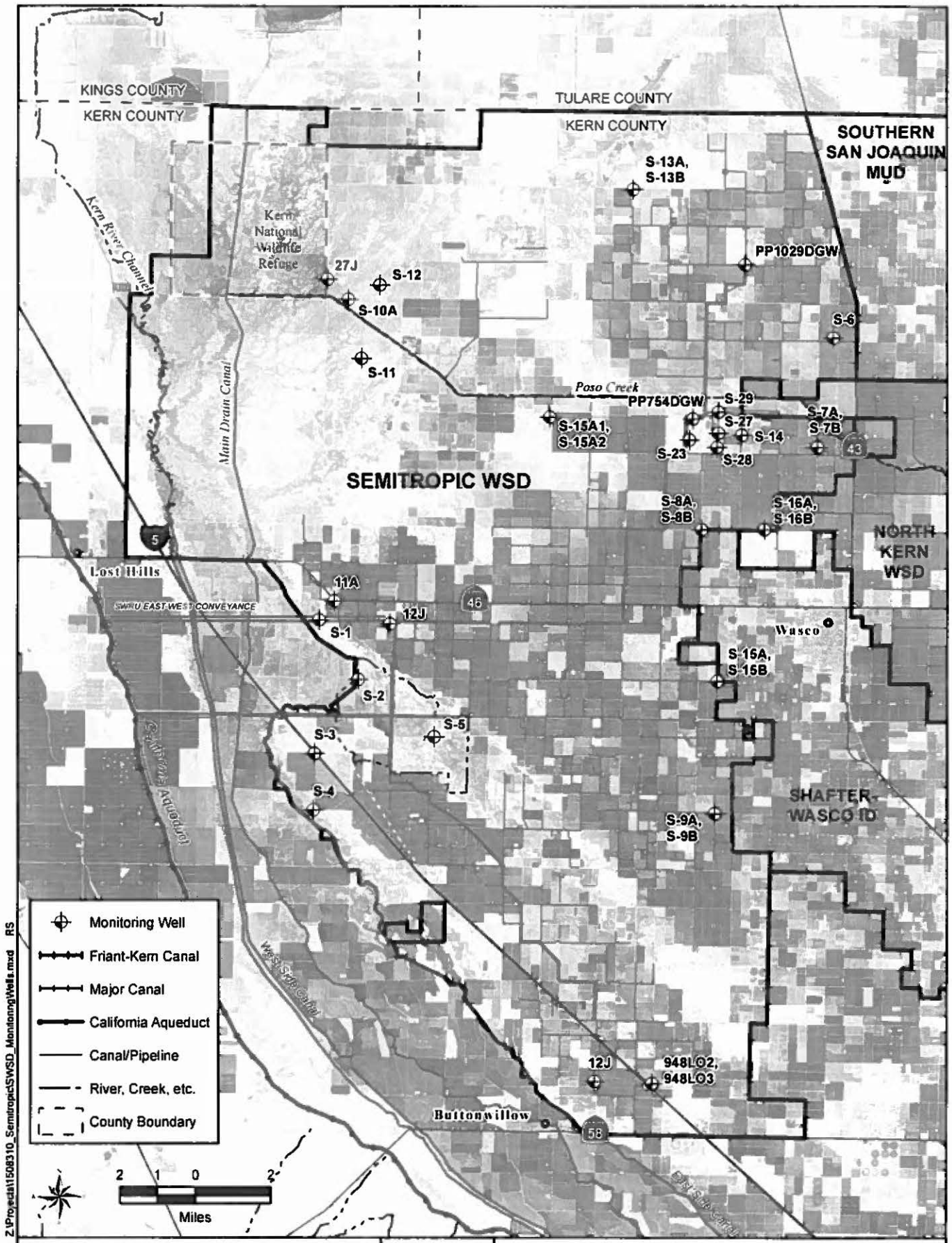
19-Jun-2015 Z:\Projects\1508310_Semitropic\PondPoso_Wells.mxd RS

Groundwater Well Extraction Improvements for Return of Stored Water Semitropic Water Storage District	GEI Consultants	Pond-Poso Spreading Ground Wells to Be Equipped JUNE 2015 FIGURE 2



23-Mar-2015 Z:\Projects\1415240_SWSDS\preadingPonds_solar.mxd RS

Groundwater Well Extraction Improvements for Return of Stored Water	GEI Consultants	Semitropic Water Storage District Basemap	
Semitropic Water Storage District		JUNE 2015	FIGURE 4

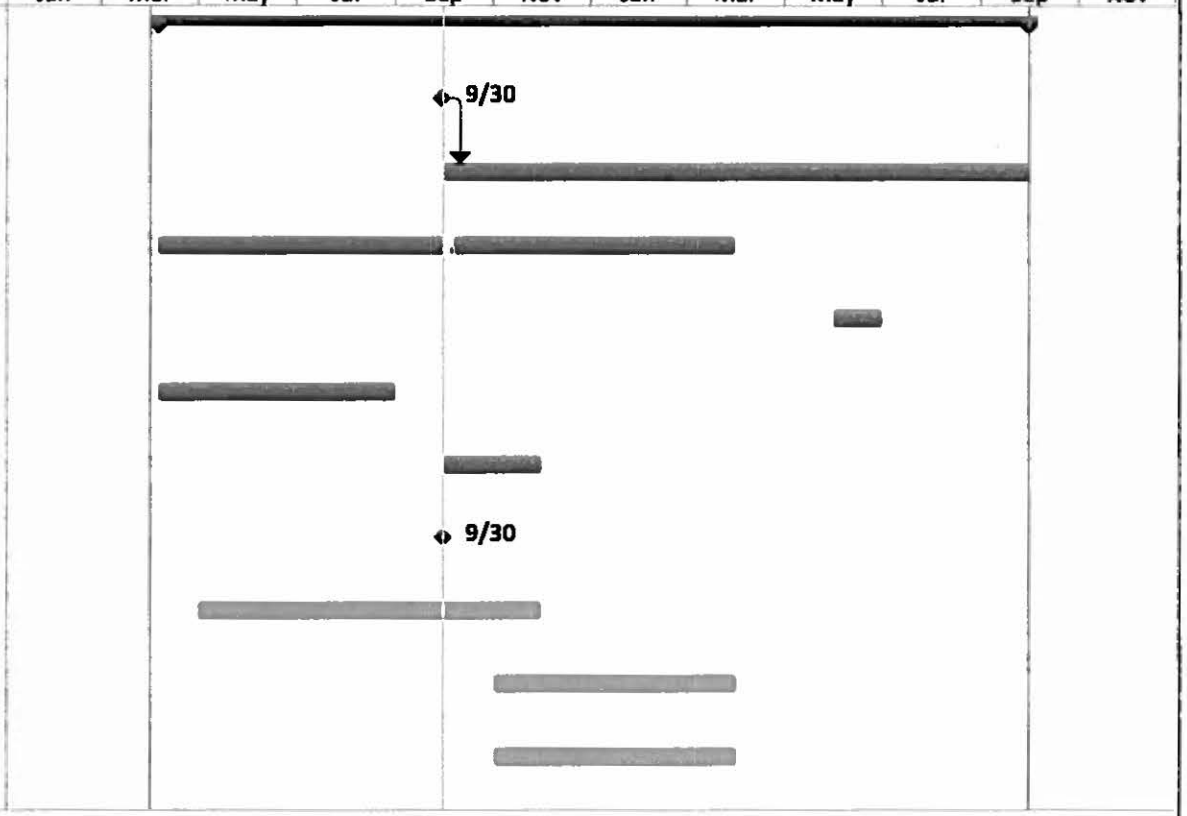


24-Jun-2015 Z:\Projects\1508310_SemitropicSWSD_MonitoringWells.mxd RS

Groundwater Well Extraction Improvements for Return of Stored Water	GEI Consultants	Monitoring Wells	
Semitropic Water Storage District		JUNE 2015	FIGURE 5

Appendix A: Project Schedule

ID	Description
1	**Groundwater Well Extraction Improvements for Return of Stored Water**
2	Grant Agreement Signed
3	Task 1 - Grant Administration
4	Task 2 - Project Reporting
5	Final Project Report
6	Task 3 - Project Design
7	Task 4 - Environmental Documentation
8	Task 5 - Permits & Approvals
9	Task 6 - Procurement Process
10	Task 7 - Project Construction (Equipping of Wells)
11	Task 8 - Construction Administration



Appendix B – Drought Plan Documents

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

- 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

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

REPORT NO. 1150

AUGUST 1999

EXECUTIVE SUMMARY

INTRODUCTION

The Water Surplus and Drought Management (WSDM) Plan for the Metropolitan Water District of Southern California (Metropolitan) is a ten-year plan that will be used to direct Metropolitan's resource operations to help attain the region's 100% reliability goal. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall objective of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is not required.

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team.

To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of proposed WSDM Principles and Implementation Goals which were subsequently adopted by the Metropolitan Board of Directors in September 1998. These Principles and Implementation Goals outline fundamental policies for guiding surplus and shortage management and establish a basis for dealing with shortages in an equitable and efficient manner.

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use, develop cost-effective local resource programs, and inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:

  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

SURPLUS AND SHORTAGE ACTIONS

The region's ability to implement a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in a variety of resources since 1991. These additional resources include increased local conservation and water recycling, improvements in the reliability of imported supplies, increased regional storage, and increased conjunctive use groundwater programs. Together these improvements allow a comprehensive approach to water management.

The growing variety of resources available to the region is transforming Metropolitan from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without impacts to its member agencies or retail customers. To attain this level of reliability, all storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan establishes the linkage between surplus and shortage resource management actions.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate available storage facilities to maximize the benefits of stored water to its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. The WSDM Plan provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Except in severe or extreme shortages (defined in the Introduction) or emergencies, Metropolitan's resource management will allow shortages to be mitigated without impacting retail Municipal and Industrial (M&I) customers. A list of resource management actions and their descriptions are provided

below. This list emphasizes critical storage programs and facilities, and conservation programs that make up part of Metropolitan's response to shortages. The order in which these actions are presented does not imply the exact operational management of resources that would occur during a shortage, rather it represents a general framework and guide. In fact, several actions are likely to be taken concurrently. Many factors will dictate the exact order in which these actions will be taken during shortages. One action, however, will have an assigned prioritization: the curtailment of Full Service (firm) deliveries will be last. The following summarizes the drought actions:

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on State Water Project (SWP) terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce Interim Agricultural Water Program (IAWP) deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement the allocation of Metropolitan's imported supplies to its member agencies

For the ten-year period addressed by the WSDM Plan, 1999-2008, the majority of shortage contingencies will be managed by withdrawals from storage, groundwater management and options transfers. Shortages managed using these actions would not impact the quantity of water delivered to member agencies for consumptive uses. In fact, when coupled with other drought actions such as extraordinary conservation and reduction of agricultural deliveries, it is fully expected that an allocation of firm imported water supplies will not be necessary during the next ten years. Under this worse-case scenario, an approach to allocate Metropolitan's firm imported water supplies in a fair and equitable manner will be developed.

The overall policy objective of the allocation method will be to minimize the impacts to any one agency and the region as a whole. To meet that objective, the method of allocating firm imported supply will account for:

- Each agency's demands on Metropolitan,
- Each agency's local resources
- Each agency's total retail demands.

The WSDM Plan allocation method would address each of these supply and demand components and account for each agency's conservation and recycled water programs. A pricing structure will be coupled with the WSDM allocation method to accomplish two goals:

- Encourage conservation and water recycling
- Ensure that the regional impact of the shortage is as small as possible

To provide as much water as possible without changing wholesale prices, the allocation of all available supplies will be made at the prevailing rates for firm deliveries. In order to encourage conservation to the level of allocation, the rate for agency usage from 100-102% of its allocation will be the Full Service rate plus $175. Usage above 102% of allocated supply will be charged at three times the Full Service rate. Any substantial change in Metropolitan's water rate structure may require these rates to be revised.

During severe or extreme shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns will send clear signals if extraordinary drought conservation is required. An effective public information campaign requires a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs program will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies are residential users, industrial and institutional users, business interests, agricultural users, elected officials, officials of various agencies such as the Department of Water Resources, and the media.

INTEGRATED RESOURCES MANAGEMENT

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed trader shortage scenarios based on historical hydrologic data. The WSDM Plan presents a resource management framework to guide Metropolitan's integrated approach to supply management.

The resource management framework does not dictate a scripted response to shortage or surplus. The framework recognizes the complexity and variety of conditions that require action. Supporting this framework are general rules that describe the actions to be taken in each stage of surplus or shortage. These rules depend on shortage stage, account for monthly delivery requirements, and depend on when various supplies would be available.

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Appendix A of this report provides a ten-year simulation of projected demands and supplies showing an example of how the region can maintain 100% reliability.

INTRODUCTION

The Metropolitan Water District of Southern California (Metropolitan) provides water to a service area covering approximately 5,200 square miles. Over 16.5 million people live within the service area, which supports a $500 billion economy. Metropolitan provides supplemental supplies to twenty-seven member agencies, both retail and wholesale agencies, who in turn provide water to over three hundred cities and local agencies providing supplies at the retail level. In recent years Metropolitan supplemental deliveries have accounted for about one-half to two-thirds of the region's total water demands. With supplies from its Colorado River Aqueduct (CRA) and the State Water Project (SWP), Metropolitan delivers water for municipal and industrial (M&I) uses, agricultural uses, and augmentation of local storage.

As part of the implementation of the regional Integrated Resources Plan (IRP), Metropolitan and its member agencies have developed the Water Surplus and Drought Management (WSDM) Plan for Southern California. This ten-year plan will direct Metropolitan's resource operations to help attain the region's 100% reliability goal. Over this ten-year period, the WSDM Plan will be updated to account for changes impacting supplies from the Colorado River and California's Bay-Delta. In the past, Metropolitan has developed drought management plans that simply addressed shortage actions and primarily focused on issues of short-term conservation and allocation of imported water. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall goal of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is no---At required.

Because it addresses both surplus and shortage contingencies, the WSDM Plans draws clear distinctions among the terms *surplus, shortage, severe shortage,* and *extreme shortage.*

> ***Surplus**: Supplies are sufficient to allow Metropolitan to meet Full Service demands, make deliveries to all interruptible programs (replenishment, long-term seasonal storage, and agricultural deliveries), and deliver water to regional and local facilities for storage.*
>
> ***Shortage**: Supplies are sufficient to allow Metropolitan to meet Full Service demands and make partial or full deliveries to interruptible programs, sometimes using stored water and voluntary water transfers.*
>
> ***Severe Shortage**: Supplies are insufficient and Metropolitan is required to make withdrawals from storage, call on its water transfers, and possibly call for extraordinary drought conservation and reduce deliveries under the IAWP.*
>
> ***Extreme Shortage**: Supplies are insufficient and Metropolitan is required to allocate available imported supplies.*

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team and the Integrated Resources Planning Workgroup. To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of "WSDM Principles and Implementation Goals."

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use and cost-effective local resource programs and to inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:
  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities.

REGIONAL RESOURCES AND DEMANDS

Southern California receives its water supplies from a variety of different sources, both local to the region and imported from outside the region. These sources are summarized below.

Local Supplies

Local supplies include groundwater pumping of local aquifers, surface reservoir production, recycled water, and supplies imported through wheeling arrangements or through the Los Angeles Aqueduct, which is owned and operated by the City of Los Angeles. Local supplies have, in the past, provided as much as 2.1 million acre-feet (maf) of water to meet the region's water demands. By far the largest component of local supplies is groundwater pumping, providing over 75% of historical local supplies.

Colorado River Supplies

The distribution and management of Colorado River water is governed by a complex body of laws, court decrees, compacts, agreements, regulations, and an international treaty collectively known as the "Law of the River." Metropolitan's entitlement is established by the fourth and fifth priorities of California's Seven Party Agreement, included in Metropolitan's 1931 and 1946 contracts with the Secretary of the Interior. These priorities provide 550,000 acre-feet (af) per year and 662,000 af per year, respectively. In addition, Metropolitan holds a surplus water contract for delivery of 180,000 af. The physical capacity of the CRA is slightly in excess of 1.3 maf per year, based on a pumping capacity of 1,800 cubic feet per second (cfs). Metropolitan's long-held objective is to maximize the availability of Colorado River water, up to the maximum capacity of the CRA, subject to environmental, contractual, legal, political, financial, and institutional constraints. A California 4.4 Plan is being developed among California parties that will help ensure that full CRA deliveries are maintained, while addressing the concerns of the other Colorado River basin states that rely on the river. The California 4.4 Plan includes core transfers (such as the IID/MWD conservation agreement and the proposed IID/SDCWA transfer), system conservation (such as the lining of the All American Canal), offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations.

State Water Project

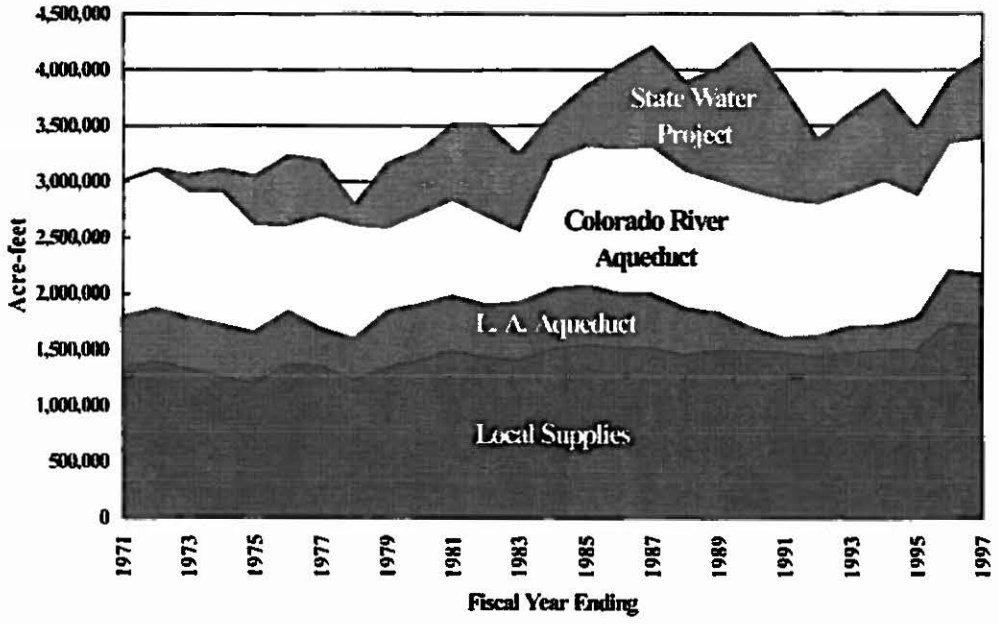
Metropolitan is one of 29 water agencies that have contracted with the State of California, through the Department of Water Resources (DWR), for water deliveries from the SWP system. Metropolitan's contracted entitlement is for 2.01 maf per year, or about 48 percent of the total contracted entitlement of 4.2 maf per year. SWP deliveries to Metropolitan are made via the SWP's California Aqueduct.

Initial SWP facilities, completed in the early 1970's, have produced average supply yields adequate to meet just over half of the total contracted entitlement. While it was intended that additional SWP facilities would be constructed as SWP contractor demands increased up to their contracted entitlements, few facilities have been constructed since that time.

The SWP obtains its supplies primarily from the Sacramento River Basin. About half of the total supply diverted from the Delta for the SWP is regulated flow from the Feather River (a tributary to the Sacramento River), while the other half is unregulated flow from runoff downstream of Sacramento River reservoirs and from other rivers that flow into the Delta. The Sacramento River watershed is subject to wide annual variations in total runoff. The Sacramento River Index (SRI), which measures runoff in the watershed, has averaged about 18 maf per year over the last 90 years. However, runoff varies widely from year to year. For example, the SRI measured 7.8 mafin 1994 and 32.5 mafin 1995.

Figure 1 shows the historical total regional supply production by type. As shown in Figure 1, water supplies were as high as 4.25 mafin 1990 and within two years dropped to 3.4 mar, a 20% decrease.

Figure 1. Historical Supply Production by Type of Supply



The historical variability in demands from 1982 to 1997 is mainly due to weather and the economy. In 1983, extreme wet weather caused a significant drop in retail demands. During the period from 1985 to 1990, hot and dry weather coupled with a strong economy resulted in increased demand from 3.5 maf to 4.0 maf, a 14% increase. In 1991, the 5th year of a prolonged drought, conditions forced many communities to implement mandatory supply reductions. These mandatory reductions coupled with extraordinary drought conservation caused a 10 to 15% decrease in retail demands for the region. In addition, the period between 1992 and 1995 was very wet (with the exception of 1994, which was dry), and was a period of severe economic recession. Southern California alone lost some 700,000 jobs from 1990 through 1995. The combination of wet weather, economic recession, and conservation resulted in demands decreasing by over 17%.

DEMANDS ON METROPOLITAN

For many member agencies, Metropolitan's water deliveries represent a supplemental supply. Most member agencies have local water supplies, but agencies differ in how much their supplies alone can meet their respective retail demands. Local supplies are often base-loaded (maximized subject to various constraints) and purchases from Metropolitan are used to meet remaining demands. In addition, to meeting consumptive demands, Metropolitan's deliveries are used to replenish local groundwater and surface reservoirs. To project demands on Metropolitan, projections of member agency's retail water demands and local water supplies are made. Local supplies are then subtracted from retail demands to get consumptive demands on Metropolitan. A projection of Metropolitan's long-term seasonal and replenishment deliveries are made based on safe groundwater yield and weather/hydrology.

Metropolitan forecasts its demands for three different broad categories: Full Service, Seasonal (reservoir storage and groundwater replenishment delivered for shift or long-term storage purposes and sold at a discount), and Agricultural (deliveries of water sold at a discount for agricultural use). Overall, demands on Metropolitan can vary -+ 11 to 18% from normal conditions due to weather and hydrology.

The following four figures show historical and projected demands on Metropolitan by category. Figure 3 shows Basic Water Deliveries, Figure 4 shows Seasonal Water Deliveries, Figure 5 shows Interim Agricultural Water Program (IAWP) Deliveries, and Figure 6 shows Total Water Deliveries for Metropolitan.

INTEGRATED RESOURCES PLANNING

To ensure supply reliability under various drought conditions, Metropolitan and its member agencies developed an Integrated Resources Plan (IRP). The IRP, adopted by Metropolitan's Board of Directors in January 1996 and periodically updated, guides Metropolitan's resource and capital improvements investments. The region's ability to develop a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in resources since 1991. To date, these investments include:

- Local supplies: Metropolitan co-funded over 23 local projects and 200 conservation programs that will yield a total of 160,000 af per year.

- **Colorado River Aqueduct:** Metropolitan developed transfers and storage programs to help ensure a full aqueduct. The landmark Metropolitan/Imperial Irrigation District Conservation Program (IID), will result in a savings of 107,000 af per year. Storage programs in Arizona and California, combined with the IID savings, yield a total of 280,000 af of annual core, dry year options, and storage supply.

- **State Water Project:** Metropolitan and other parties negotiated the Bay-Delta Accord and the Monterey Amendment. The Bay-Delta Accord and subsequent efforts will increase the reliability of Metropolitan's entitlement deliveries. The Monterey Amendment provides access to 220,000 af of SWP storage.

- **In-Basin Storage:** Metropolitan is constructing the Eastside Reservoir Project, with 800,000 af of storage (400,000 af of which is emergency storage for use in case of facility failure as a result of earthquake or other event).

- **Groundwater Conjunctive Use Storage:** Metropolitan developed a conjunctive use storage program in the North Las Posas Basin in Ventura County with an anticipated capacity of 210,000 af and a dry-year withdrawal rate of up to 70,000 af.

- **Transfers and Storage:** Metropolitan developed the Semitropic Storage Program, with 350,000 af of storage and dry-year withdrawals averaging about 60,000 af. Metropolitan also approved the Arvin-Edison Storage and Transfer Program, with 250,000 af of storage and dry-year withdrawals averaging about 70,000 af. Metropolitan is also exploring storage and transfer programs with the Coachella Valley Water District and the Cadiz Land Company.

As a result of these investments, it is anticipated that Metropolitan and its member agencies will be 100% reliable over the next 10 years even under a repeat of the 1991 drought condition. Figure 7 compares actual Metropolitan demands and supplies during 1991 (the last year in a multiyear severe drought) and projected demands and supplies in year 2005 (assuming a repeat of 1991 conditions). In 1991, the region faced shortages that required Metropolitan to allocate water under the Incremental Interruption and Conservation Plan (IICP). The reduction in deliveries came after demands had already been reduced as a result of local conservation. In addition, water had to be purchased from the Governor's drought emergency water bank. By the year 2005 with the investments made to date,

SURPLUS AND SHORTAGE RESOURCE ACTIONS

Metropolitan's investments in water resources, facilities, and programs has transformed it from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without negative impacts to its member agencies or retail customers. To attain this level of reliability, storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan recognizes the linkage between surplus and shortage resource management actions.

SURPLUS ACTIONS

The combination of Metropolitan's regional storage facilities, such as Lake Mathews, Lake Skinner, the future Eastside Reservoir Project, and the storage capacity available to Metropolitan in Castaic Lake and Lake Perris as a result of the Monterey Amendment, allows Metropolitan great flexibility in managing its water resources. The development of storage programs both outside and within the service area provides even greater flexibility in storing surplus water. Each of the storage facilities and programs plays an important role in achieving Metropolitan's reliability goal.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate storage facilities to maximize stored water to benefit its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. This section provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Storage of Colorado River Supplies

Metropolitan has participated in a number of programs to maximize the reliability of supplies from the Colorado River. The landmark Metropolitan/Imperial Irrigation District Conservation Program will result in a savings of 107,000 af per year. These supplies will increase the reliability of Metropolitan's entitlement of Colorado River water. Other programs yield shortage benefits by increasing amounts of water stored for use during shortages. Between August 1992 and July 1994, Metropolitan and the Palo Verde Irrigation District conducted a Test Land Fallowing Program. Approximately 20,000 acres of farmland in the Palo Verde Valley were not irrigated, saving 186,000 af of water which was stored in Lake Mead for later use by Metropolitan. With Arizona and Nevada water agencies, Metropolitan is participating in a Central Arizona Groundwater Storage Demonstration Program that has encouraged the storage of water. To date, 139,000 af of supplies have been stored in groundwater basins in Central Arizona. The Desert Coachella program is an exchange and storage program with agencies situated along the Colorado River Aqueduct. Metropolitan releases Colorado River water for storage in the Coachella Groundwater Basin. Metropolitan then exchanges these supplies for the

participating agencies' SWP supplies. These programs serve as models for future programs that could increase the reliability of Colorado River supplies. Metropolitan continues to explore other possible options that would increase the reliability of supplies. The California 4.4 Plan is being developed among California parties to increase storage programs for Colorado River supplies. In addition to core transfers and conservation programs, the California 4.4 Plan includes offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations. These programs, in conjunction with favorable supply determinations by the Secretary of Interior, will ensure the highest possible reliability of Colorado River supplies.

In addition to the programs mentioned above, the Colorado River system itself contributes to the high reliability of Metropolitan's Colorado River supplies. Currently, the average Colorado River runoff exceeds basin-wide demands by over 1.0 maf per year. The Colorado River system also contains a great deal of reservoir storage capacity. The total storage capacity in the Colorado River Basin is approximately 60 maf, almost four times the Colorado River's average annual flow. For much of 1997, system storage levels were at 80% or more of total capacity. These factors allow the Bureau of Reclamation, operators of the Colorado River system, to store significant supplies for use during shortages.

Storage of State Water Project Supplies

Total storage capacity is a critical factor in comparing the operations of the Colorado River system with the SWP. On average, both systems have similar amounts of water available on an annual basis. The SWP's watersheds in the Sacramento River Basin have produced about 18 maf per year over the long term, as represented by the Sacramento River Index (SRI.) Long-term runoff on the Colorado River has averaged more than 16 maf annually since 1906. However, the ability to carry over unused water from a wet year for use in a dry year differs substantially between the two systems. State Water Project storage facilities have storage capacity of about 4.5 maf, while system storage in the Colorado River Basin totals nearly 60 maf. This gives the operators of the Colorado River reservoirs much more flexibility in storing unused water from a wet year for use in a subsequent dry year.

When water from the SWP cannot be put to immediate use in Metropolitan's service area, the water may be stored for future use. Provided storage capacity is available, the water may remain in either Oroville Reservoir (as SWP storage for delivery to all contractors the following year) or San Luis Reservoir (as carryover storage assigned to Metropolitan). Through the carryover storage program, as amended by the Monterey Amendment, Metropolitan can place a maximum of 200,000 af per year of allocated supplies in SWP surface reservoirs. The program also allows for carryover storage in non-project facilities, including surface reservoirs and groundwater basins. In the case of carryover storage in San Luis Reservoir, SWP supplies allocated to but unused by a contractor may, under certain conditions, be assigned as carryover if storage capacity is available at the end of the calendar year. However, carryover water stored for a contractor has lower priority than storage of SWP water and consequently "spills" first as San Luis Reservoir fills.

Also, in a wet year such as 1995, low demands may allow DWR to operate San Luis Reservoir nearly full, eliminating any possibility of contractor carryover storage into the following year. As a result, carryover storage on the SWP may not be possible, and even when possible, is subject to spilling.

Due to these carryover storage limitations, Metropolitan has invested a great deal to expand its ability to store surplus SWP supplies. Metropolitan has entered into a number of water transfer and storage agreements. The Semitropic Water Banking and Exchange program allows Metropolitan to store up to 350,000 afin the groundwater basin underlying the Semitropic Water Storage District. The storage and withdrawal capacities of the program are shared with other participants in the storage program, with Metropolitan's share equaling 35%. Dry-year withdrawals will average about 60,000 af.

Metropolitan and the Arvin-Edison Water Storage District have developed a program that allows Metropolitan to store water in the groundwater basin in the Arvin-Edison service area. The program would allow the storage and withdrawal of 250,000 af of supplies over the next 25430 years. Dry-year withdrawals will average about 70,000 af.

Storage in Regional Facilities

In addition to the storage of Colorado River and SWP supplies outside the region, Metropolitan has established a number of programs for storing supplies within the region. Metropolitan owns and operates two main surface reservoirs, Lake Mathews and Lake Skinner, which have a combined storage of about 226,000 af. Only a small portion of this capacity is available for shortages, with the balance being used to regulate flows in Metr0Politan's delivery system. The Eastside Reservoir Project, currently under construction, will have a total capacity of 800,000 af, with approximately 400,000 af of operational drought and seasonal storage and 400,000 af of emergency storage. Through the Monterey Amendment, Metropolitan obtained the fight to use up to 220,000 af of water stored in the SWP terminal reservoirs. However, withdrawals from these terminal reservoirs must be replaced within five years.

Metropolitan and its member agencies have established the cyclic storage program to increase storage in groundwater basins within the service area. Regional groundwater basins offer an economical way for Metropolitan to improve supply reliability by storing water within the service area. This makes water readily accessible in times of need, either in emergency situations or during shortages. Some limitations are imposed by the fact that such water can generally only be used through pumping from the groundwater basin by an overlying member agency or local agency. Storage in groundwater basins takes place either by direct replenishment (spreading or injection), or through in-lieu means. Spreading (or injection) is desirable because direct measurement of the amount of stored water is a relatively simple, verifiable transaction. The main disadvantage to direct spreading is that spreading can occur only under certain conditions. For example, spreading cannot occur when spreading facilities are being used to capture local storm runoff for flood control purposes, or when the amount of local runoff precludes the need

for imported water to replenish the basins. Also, spreading basins require frequent maintenance to assure maximum efficiency. These and other conditions can limit the ability to deliver water for spreading at a time when surplus supplies are available.

In-lieu replenishment allows most member agencies to participate in groundwater replenishment without needing direct access to replenishment facilities. Their wells, in effect, become their replenishment facilities. Both direct and in-lieu replenishment from 1986 through 1990 served the region well during the critical drought years from 1991 through 1993.

The overall objective of the various storage programs is to maximize the availability of imported water during times of need by storing surplus water in a strategic manner and utilizing the storage available within the region. Many factors affect the availability of storage capacity and Metropolitan's ability to move water to and from various facilities. After reviewing the full range of shortage actions available to Metropolitan, a framework for prioritizing the full range of surplus and shortage actions will be presented.

In addition to pricing incentives used to encourage local agencies to store water in groundwater basins, Metropolitan has developed a conjunctive use contractual storage program with the Calleguas MWD in the North Las Posas Basin. Metropolitan will fund the construction of wells which will be called upon to meet demands during dry years. This program will yield a dry year supply of about 70,000 af.

SHORTAGE ACTIONS

Except in severe or extreme shortages or emergencies, Metropolitan's management of available resources will allow shortages to be mitigated without negatively impacting retail M&I demands. Below is a list of drought actions that will be taken during periods of shortage. The goal of these actions is to avoid, to the extent practicable, the allocation of Metropolitan's firm supplies. The order in which these actions are presented does not imply the exact operational management of resources that would occur. In fact, several actions are likely to be taken concurrently. Many factors dictate the particular order in which actions will be taken during an actual shortage, although it is clear that the last action will be the curtailment of firm deliveries to the member agencies.

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on SWP terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce IAWP deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement an allocation of Metropolitan's imported supplies to its member agencies

Even with dedicated programs to meet the reliability goal for the region, proper management and operations of these resources is critical to ensure reliability. The prioritization of both surplus and shortage actions need to account for several important criteria. It is also important to recognize that these criteria will need to be balanced. The criteria include:

Location: Out-of-region storage is more vulnerable than in-basin-storage due to the risks of seismic events. To only maximize out-of-region storage will put reliability at risk.

Take capacity: Surface reservoirs generally have the ability to be filled and drawn down very quickly. Certain groundwater storage programs have limited take capacities--requiring several years at full take capacity to withdraw **all** available storage. Stored water will be balanced so that dry year supplies are maximized.

Cost: Programs vary with respect to their marginal operating costs. Program actions will be taken to maximize supply reliability while minimizing cost.

Flexibility: Not all storage programs and transfers offer the same flexibility to Metropolitan. Some programs can only meet specific overlying demands, while others can meet demands anywhere in the system.

DESCRIPTIONS OF RESOURCE ACTIONS

Draw on storage in the Eastside Reservoir Project: Withdrawals from the Eastside Reservoir Project would provide a flexible supply for meeting a shortage. Eastside Reservoir Project supplies can be drawn upon quickly. The amount of water drawn from the Eastside Reservoir Project before exercising other shortage actions will depend on the severity of the shortage and the overall condition of other resources available to Metropolitan.

Draw on out-of-region storage in Semitropic and Arvin-Edison programs: Out-of-region programs such as Semitropic and Arvin-Edison provide cost-effective shortage supplies. These supplies also provide flexibility, as they can be distributed as effectively as any SWP supplies coming into Metropolitan's service area. Exercising these programs relatively early in the order of actions reduces the risk of leaving supplies out-of-region. Based upon the ratio of storage capacity to take capacity, these programs will generally provide supplies over several years. This provides the rationale for calling on these programs relatively early in a shortage.

Reduce Long-Term Seasonal and Replenishment Deliveries, and call on cyclic storage accounts: Certain interruptible supply programs provide benefits during shortage. Reducing deliveries to interruptible programs established for storage purposes, while continuing expected levels of groundwater production, allows limited supplies to go toward meeting direct consumptive uses. In addition, calling on cyclic storage accounts can extend the replenishment needs for several years. Most replenishment supplies would be expected to be interruptible for a minimum of two years before agencies would be allowed to claim a local supply adjustment on such supplies. Some programs have longer interruption requirements. For example, most Groundwater Recovery Programs are governed by contracts that require supply production through a three-year interruption in service.

Draw on contractual groundwater storage programs: In-region contractual groundwater programs provide cost-effective supplies that would be drawn upon during shortages. These programs are also

limited by their take capacities and generally have several years of withdrawals in storage. For this reason, these programs might be called upon before withdrawing heavily from surface reservoir storage.

Draw on SWP terminal reservoir storage: The storage available in the SWP terminal reservoirs provides a flexible and cost-effective shortage supply. Supplies withdrawn from this program must be replaced within five years of withdrawal. For this reason, the storage in these reservoirs would be reserved for more serious shortage conditions and would be utilized after the programs and facilities listed above were used to meet the shortage.

Call for extraordinary drought conservation: Voluntary conservation programs have historically been effective in reducing water demand during drought. However, voluntary conservation programs are not without impact to the retail customer and can be perceived as a failure of water agencies to properly plan for shortages. Therefore, the call for extraordinary drought conservation will only be taken with the consent of Metropolitan's Board of Directors.

Reduce agricultural deliveries: The Interim Agricultural Water Program (IAWP) offers interruptible water to southern California's agricultural industry at discounted rates. These supplies will be interrupted as part of Metropolitan's shortage actions. Metropolitan will work with IAWP participants to provide as much advance warning of interruption as possible. The IAWP reflects current policies toward agricultural water users. The policies underlying this program are due to be reviewed during the ten-year period of the WSDM Plan. The WSDM Plan will be changed accordingly.

Call on water transfer option contracts: Transfer options programs provide cost-effective supplies when the region is faced with reducing deliveries to meet consumptive demands. These programs might also be used to increase storage levels in Metropolitan storage facilities. Replenishment of these facilities reduces the risk of leaving available supplies outside the region and helps to protect the region during extended shortages.

Purchase transfers on the spot market: During the 1987-92 drought, the Drought Water Bank proved to be one mechanism for California to reduce the overall impacts of the shortage. However, the cost of spot market supplies may cause Metropolitan to use them as a last increment of supply before the region implements reductions in M&I deliveries. It is likewise possible that availability and cost will make spot market options more favorable under certain conditions. If this occurs then spot market supplies will be sought prior to calls on option transfers. However, participation in the spot market may be restricted to those agencies that have already taken significant actions in response to the shortage.

INTEGRATED RESOURCE MANAGEMENT STRATEGY

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed under shortage scenarios based on historical hydrologic data. Certain strategies yield high reliability but incur very high costs. This is the case for strategies that utilize relatively costly transfer programs early in a shortage while maintaining high storage levels. If a shortage is short, this results in high transfer costs and shortage storage programs that are not fully utilized. Other strategies draw more heavily on storage early in a shortage and do not use options transfer programs. Later in a shortage, the yields from these transfer programs, combined with low yields from depleted storage facilities, might not make up for continuing or deepening shortages. Overall, such approaches may be inexpensive to pursue at the wholesale level but have high costs associated with retail level impacts. The resource management framework presented results from extensive analysis of various strategies for managing available resources under a variety of surplus and shortage conditions. Although the extent to which various actions are exercised may still vary depending on specific shortage conditions, the ordering presented does reflect Metropolitan's anticipated order of actions during shortages.

RESOURCE MANAGEMENT FRAMEWORK

The analysis of surplus and shortage actions yields a water management framework that accounts for the degree or "stage" of surplus and shortage. These stages are defined by parameters such as storage levels and expected SWP supplies. Each stage has associated actions that could be taken as part of the response to prevailing shortage conditions. For example, Surplus Stage 1 might have as associated actions to place water in the highest-priority storage resources. Figure 8 shows the mapping between actions and stages. The darkly shaded diagonal area identifies actions that can be undertaken concurrently, while the lightly shaded areas show actions that will not be taken. For example, Metropolitan will not withdraw water from most storage resources during a surplus.

Figure 8 highlights several aspects of the WSDM Plan's approach to supply management. First and most importantly, it does not dictate a response to shortage or surplus. The framework recognizes the complexity and variety of conditions that could require various responses. Supporting this framework are general "rule curves" that dictate the extent to which particular actions are taken in various stages of surplus or shortage. For example, the rule curves indicate approximately how much water should be taken from the Eastside Reservoir Project before calling on supplies from the Semitropic or Arvin-Edison storage programs. If a shortage were greater than the desired initial withdrawal from the Eastside Reservoir Project, then Stage 2 actions would be taken. The rule curves for a particular resource would take into account shortage stage, monthly delivery requirements, and when various supplies are available.

Surplus and Shortage Stages are determined by the total amount of water that would be stored or produced by exercising the actions in that Stage. Overall storage levels in each stage are determined by the extent to which storage is increased or reduced by earlier actions. Therefore, each Stage is defined by supplies (stored or produced) and an approximate overall level of storage remaining in all resources. Up through Shortage Stage 4, the actions taken will not result in negative impacts to any consumptive uses. Shortage Stages 1 through 4 constitute shortage management without retail level impacts. The conservation efforts and reductions in IAWP deliveries in Shortage Stage 5 will result in retail impacts.

As with the listing of shortage actions earlier in the report, the Stages/Actions matrix in Figure 8 only highlights certain programs and response actions. However, unlike the discussion of actions earlier, Figure 8 is intended to convey Metropolitan's currently anticipated ordering for those actions listed. As the supply and demand outlooks, programs, and other factors continue to change, the analysis of the ordering of actions will continue during the ten-year period of the WSDM Plan.

SUPPLY CERTAINTY AND THE TIMING OF RESOURCE ACTIONS

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Figure 9 shows a hypothetical shortage year. With respect to the supply and demand outlook, a typical shortage year will have periods of certainty and stability, and other periods of relative uncertainty and transition. Important supply components--such as the SWP, CRA, Los Angeles Aqueduct (LAA), and local supplies--are closely monitored through the early part of the year. These supplies and demands are fairly well-known through the April-September period. Storage is assessed in the post-summer period and decisions about certain programs, such as long-term (LT) seasonal deliveries could be made at this time.

APPENDIX A: RESOURCE AND STORAGE SIMULATION

The Water Surplus and Drought Management Plan (WSDM Plan) uses the Stages and Actions Matrix (Figure 8) as a guide for the operation of storage and transfers for the next ten years, 1999-2008. Metropolitan asserts that the investments that Metropolitan and its member agencies have made in water supply and storage, managed in a coordinated manner as presented in the WSDM Plan, will be sufficient to assure that retail firm water demands will be met 100% of the time through the year 2008. Metropolitan performed an extensive analysis of projected water demands, current and expected water supplies, along with hydrologic variations to support this assertion. Appendix A presents a summary of this analysis which includes statistical probabilities of actions under the WSDM Plan and two illustrative examples of how supply resources may be used in the future under worst-case drought events. Although the WSDM Plan is intended to be in effect through 2008, for the purposes of analysis the planning horizon was extended through 2010.

The WSDM Plan seeks to define the operational envelope for the Metropolitan system into the near future. Although the WSDM Plan only looks out ten years, it nonetheless involves the operation of some storage and water transfer projects that have not yet become fully operational. This makes the estimation of storage and transfers operations difficult. Compounding this problem is the lack of certainty around future demands, economic conditions, or even the weather over the next ten years. To manage these uncertainties, Metropolitan has developed a computer based simulation model called the Integrated Resources Planning Simulation Model or IRPSIM.

IRPSIM uses a modeling method known as sequentially indexed monte-carlo simulation. Simply put, the model looks at projected regional retail demand and supplies of water over the next twelve years and adjusts each, up or down, based on an assumed pattern of future weather. For instance, if Metropolitan expected the weather over the next twelve years (1999-2010) to be the same as the last twelve years (1987-1998), then IRPSIM would adjust the projected 1999 demands and supplies based on the historical 1987 hydrology, and adjust the projected 2000 demands and supplies using the historical 1988 hydrology, and so on. One obvious drawback to this approach is that Metropolitan does not know what future weather will be. Therefore, Metropolitan runs the models over and over again until all recorded hydrologies, 70 in all, have been tried. In this way, Metropolitan can look at probabilistic results of being in shortage year by year through 2010.

Although the projections of water supplies used in this analysis required certain assumptions to be made, they were based on most likely or probable outcomes. In most cases, projected water supplies represented projects that are currently operational, under construction, or in the final stages of negotiations. The following represents a summary of these assumptions:

- Local recycling and groundwater recovery: assumes currently operational projects with expected increases in supply yield as demand increases

- Conjunctive use groundwater storage: assumes Las Posas (under final stages of construction) and implementation of similar programs which are under negotiation (such as Raymond, Orange, and Chino Basins)

- Semitropic and Arvin-Edison storage: assumes use of both programs which are operational with water already stored

Table A-1. Probability of Shortage Stage[1] by Forecast Year

1999	13%	13%	11%	7%	3%	0%	0%
2000	13%	13%	11%	9%	3%	0%	0%
2001	19%	17%	13%	10%	6%	0%	0%
2002	19%	17%	13%	10%	4%	1%	0%
2003	19%	19%	14%	11%	4%	0%	0%
2004	20%	19%	16%	13%	4%	0%	0%
2005	21%	19%	17%	13%	6%	0%	0%
2006	21%	19%	19%	13%	6%	0%	0%
2007	23%	20%	19%	13%	4%	0%	0%
2008	26%	21%	19%	16%	6%	1%	0%
2009	26%	24%	19%	17%	6%	1%	0%
2010	26%	26%	19%	19%	6%	1%	0%

Table A-1 can be read in one of two ways, by column or row. The Stage 7 column indicates that there are no historical weather conditions that require allocation over the next twelve years. This is the single most important conclusion of the WSDM Plan analysis. The Stage 6 column indicates that only in a few years--2002, and 2008 through 2010--would Metropolitan need have a need for option or spot transfer water. Read by row, Table A-1 indicates that in the year 2008 there is a 21% likelihood of taking some water from the Eastside Reservoir Project, a 19% likelihood of taking water from Semitropic or Arvin-Edison storage programs, a 17% likelihood of interrupting long-term seasonal and replenishment deliveries for two years, and so on. It should be noted that these probabilities represent the best current estimates by Metropolitan, but are based entirely on historical weather conditions. Conditions that fall outside of historical ranges, either in duration or severity, are not represented by this data.

Another way to view the WSDM Plan analysis is by observing the operation of a single hydrology. Table A-2 provides an example of resource operations for the period 1999 through 2010 assuming a repeat of the 1923 through 1934 hydrology. The table provides descriptions of hydrologic conditions to aid in understanding the example.

[1] Stage 1 consists of withdrawal from the Eastside Reservoir Project. Stage 2 consists of the above plus withdrawals from the Semitropic and Arvin-Edison water storage and transfer projects. Stage 3 consists of the above plus an interruption of Long-Term Seasonal and Replenishment discount water. Stage 4 consists of the above plus withdrawal from contractual groundwater programs and the Monterey Reservoirs. Stage 5 consists of the above plus a call for extraordinary drought conservation and interruption in agricultural discount water. Stage 6 consists of the above plus calls on option contract water and purchases of water on the open market. Stage 7 consists of the above plus allocation of remaining shortages. For a full description of stages and action, see Surplus and Shortage Resource Actions section and Figure 8 above.

Table A-2. A Simulation of Water Supplies and Demands 1923-1934 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Dry	Dry	Dry	Wet	Wet	Dry	Dry	Normal	Wet	Normal	Wet	Normal
Sacramento River Index D1630 Year Type	Below Normal	Critically Dry	Dry	Dry	Wet	Above Normal	Critically Dry	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.979	4.152	4.149	4,018	4.005	4.249	4.237	4.223	4.280	4.280	4.407	4.500
Long-term/Replenishment Demand	0.165	0.182	0.226	0.188	0.149	0.176	0,213	0.203	0.164	0.175	0.141	0.163
Total Demand	4.144	4.334	4.375	4.205	4.154	4.425	4.450	4.426	4,443	4.455	4.548	4,663
Local Supplies												
Groundwater Production	1.529	1.545	1.537	1.288	1.299	1.575	1.568	1.434	1.307	1.439	1.318	1.454
L. A. Aqueduct Production	0.383	0,287	0.304	0.316	0.392	0.302	0,245	0.235	0.174	0,324	0.251	0.220
Recycling Production	0.152	0.162	0.174	0.186	0,197	0.207	0.217	0.230	0,242	0.254	0.266	0.277
Surface Production	0,128	0,089	0,076	0.116	0.154	0.147	0.108	0.094	0,133	0,136	0.151	0.145
Total Local Supply	2,192	2.084	2.091	1.905	2,043	2.231	2,139	1.993	1.856	2.153	1.986	2,097
Total MWD Demand	1.952	2.250	2,284	2,300	2.112	2.194	2.311	2.433	2.587	2.302	2.562	2.566
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
State Water Project Supply	1.754	0.812	0.783	1.280	1.678	1.438	0,764	1.163	0,589	0.843	0.559	0.620
MWD Cyclic Groundwater Deliveries	0.000	0.060	0.060	0.000	0.000	0,000	0.060	0,060	0.060	0.059	0.000	0.000
Eastside Reservoir	0.000	0.066	0.058	0.000	0.000	0.000	0,060	0.010	0.425	0.023	0.219	0.041
Arvin/Semitropic Groundwater Storage	0.000	0.111	0.115	0,000	0.000	0,000	0,119	0,000	0.115	0.117	0.059	0.041
Longterm Seasonal Demand Cuts	0.000	0,000	0,166	0.000	0.000	0.000	0.153	0.000	0.104	0,116	0.000	0.000
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000	0,000	0.060	0.060
Contractual Groundwater Storage	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0,000	0.095	0.000	0.095	0.084
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.131	0.088
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.206	0.210
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.033	0.031
Central Valley Transfers	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
Storage Puts	1.003	0.000	0.097	0.180	0.549	0.438	0.045	0.000	0,000	0.056	0.000	0.000
Remaining Shortage	0,000	0,000	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000

Table A-3. A Simulation of Water Supplies and Demands 1980-1991 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Wet	Normal	Normal	Wet	Dry	Dry	Wet	Normal	Normal	Dry	Dry	Normal
Sacramento River Index D1630 Year Type	Above Normal	Dry	Wet	Wet	Wet	Dry	Wet	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.781	4.170	3.930	3.647	4.308	4.250	4.151	4.281	4.380	4.550	4.663	4.497
Lon£1-term/Replenishment Demand	0.105	0.141	0.171	0.101	0.136	0.187	0.183	0.201	0.191	0.219	0.224	0.214
Total Demand	3.886	4.311	4.101	3.748	4.444	4.437	4.334	4.483	4.572	4.769	4.887	4.712
Local Supplies												
Groundwater Production	1.292	1.440	1.381	1.248	1.546	1.565	1.275	1.413	1.438	1.588	1.600	1.446
L. A. Aqueduct Production	0.462	0.372	0.499	0.529	0.516	O.367	0.472	0.400	0.326	0.278	0.213	0.223
Recycling Production	0.152	0.162	0.174	0.186	0.197	0.207	0.217	0.230	0.242	0.254	0.266	0.277
Surface Production	0.225	0.175	0.154	0.194	0.195	0.151	0.115	0.116	0.115	0.081	0.068	0.081
Total Local Supply	2.131	2.149	2.208	2.156	2.455	2.290	2.081	2.159	2.122	2.200	2,146	2.027
Total MWD Demand	1.755	2.162	1.894	1.591	1.989	2.147	2.253	2.324	2.450	2.569	2.741	2.684
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1,200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
State Water Project Supply	1.561	1.441	1.725	1.886	1.643	1.590	1.441	1.292	0.611	1.285	0.877	0.389
MWD Cyclic Groundwater Deliveries	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.060	0.060	0.060
Eastside Reservoir	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.199	0.024	0.222	0.209
Arvin/Semitropic Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.115	0.000	0.122	0.104
Long-term Seasonal Demand Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.000	0.164	0.154
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Contractual Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.095	0.085
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.216
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.235
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032
Central Valley Transfers	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Storage Puts	1.006	0.260	0.344	0.240	0.200	0.200	0.388	0.168	0.000	0.000	0.000	0.000
Remaining Shortage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

2010 Urban Water Management Plan

Final

Prepared for:

Castaic Lake Water Agency (CLWA)
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company
(Los Angeles County Waterworks District No. 36/Cooperating Agency)

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Table of Contents (cont'd)

List of Appendices

List of Abbreviations and Acronyms

The following abbreviations and acronyms are used in this report.

AB	Assembly Bill
ACOE	U.S. Army Corps of Engineers
Act	California Urban Water Management Planning Act
AF	acre-feet
AFY	acre-feet per year
Agency	Castaic Lake Water Agency
APA	Administrative Procedure Act
AWRM	Alternative Water Resources Management Program
AWWARF	American Water Works Association Research Foundation
Basin	Santa Clara River Valley Groundwater Basin, East Subbasin
BDCP	Bay Delta Conservation Plan
BMPs	Best Management Practices
BO	Biological Opinion
BVWSD	Buena Vista Water Storage District
CCF	One Hundred Cubic Feet

Table of Contents (cont'd)

CCR	Consumer Confidence Report
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESA	California Endangered Species Act
CLWA	Castaic Lake Water Agency
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DBP	Disinfection by-products
D/DBP	Disinfectants and Disinfectant By-Products
Delta	Sacramento-San Joaquin Delta
DFG	California Department of Fish and Game
DHS	California Department of Health Services
District	Los Angeles County Waterworks District No. 36
DMM	Demand Management Measure
DOF	Department of Finance
DPH	Department of Public Health
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EC	Electrical conductivity
Edison	Southern California Edison
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETo	evapotranspiration
FWS	United States Fish and Wildlife Service
GPCD	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GSWI	groundwater and surface water interaction model
GWMP	Groundwater Management Plan
HAA5	Haloacetic Acids
KCWA	Kern County Water Agency
LACDRP	Los Angeles County Department of Regional Planning
LACSD	Sanitation Districts of Los Angeles County
LACWWD 36	Los Angeles County Waterworks District No. 36

Table of Contents (cont'd)

M&I	Municipal and Industrial
MCL	Maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California
MAF	million acre-feet
mgd	million gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding Regarding Water Conservation in California
MWD	Metropolitan Water District of Southern California
NCWD	Newhall County Water District
NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OVOV	One Valley One Vision
Plan	Urban Water Management Plan 2010
PPHH	persons-per-household
PUC	California Public Utilities Commission
Purveyor	Supplier of drinking water at the retail level (also retailer and retail purveyor)
RAP	Remedial Action Plan
RO	Reverse Osmosis
RRB	Rosedale-Rio Bravo
RRBWSD	Rosedale-Rio Bravo Water Storage District
RPA	Reasonable and Prudent Alternative
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SCLLC	Santa Clarita LLC
SCOPE	Santa Clarita Organization for Planning the Environment
SCVSD	Santa Clarita Valley Sanitation District
SCWD	Santa Clarita Water Division
SRWS	self-regenerating water-softeners
Semitropic	Semitropic Water Storage District
SSO	site specific objective
SOC	Synthetic organic compounds
SWP	State Water Project
Suppliers	CLWA and purveyors collectively

Table of Contents (cont'd)

SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
THM	Trihomethanes
TTHM	Total Trihalomethanes
TOC	Total Organic Carbon
umhos/cm	Micromhos per centimeter
USCR	Upper Santa Clara River
UWMP	Urban Water Management Plan
Valley	Santa Clarita Valley
VOC	Volatile organic compounds
VWC	Valencia Water Company
WTP	Wastewater Treatment Plant
WRP	Water Reclamation Plant
WQOs	Water Quality Objectives

Section 1: Introduction

1.1 Overview

This volume presents the Urban Water Management Plan 2010 (Plan) for the Castaic Lake Water Agency (Agency, CLWA) service area, which includes four retail water purveyors. These retail water purveyors are the Santa Clarita Water Division of CLWA, Newhall County Water District, Valencia Water Company and Los Angeles County Waterworks District 36. Together CLWA and the purveyors are the Santa Clarita Valley's 'water suppliers'. This chapter describes the general purpose of the Plan, discusses Plan implementation and provides general information about CLWA, the retail purveyors and service area characteristics.

1.2 Purpose

An Urban Water Management Plan (UWMP) is a planning tool that generally guides the actions of urban water suppliers. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "...describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (Wat. Code, § 10631, subd. (d)). The identification of such opportunities and the inclusion of those opportunities in a plan's general water service reliability analysis neither commits an urban water supplier to pursue a particular water exchange/transfer opportunity, nor precludes it from exploring exchange/transfer opportunities never identified in its plan. Before an urban water supplier is able to implement any potential future sources of water supply identified in a plan, detailed project plans are prepared and approved, financial and operational plans are developed and all required environmental analysis is completed.

"A plan is intended to function as a planning tool to guide broad-perspective decision making by the management of water suppliers." (*Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal. App. 4th 33, 39.) It should not be viewed as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty and planning projections may change in response to a number of factors. "[L]ong-term water planning involves expectations and not certainties. Our Supreme Court has recognized the uncertainties inherent in long-term land use and water planning and observed that the generalized information required . . . in the early stages of the planning process are replaced by firm assurances of water supplies at later stages." (*Id.*, at 41.) From this perspective, it is appropriate to look at the UWMP as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these "framework" questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands.

The water suppliers will explore enhancing basic supplies from traditional sources such as the State Water Project (SWP) as well as other options. These include groundwater extraction, water exchanges and transfers, water conservation, recycling, brackish water desalination and water banking/conjunctive use. Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option would impact the environment and how each option would affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of the customers are met.

The California Urban Water Management Planning Act (Act) requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments. (CLWA and the purveyors are going beyond the requirements of the Act by developing a plan which spans forty years.)
- Identifies and quantifies adequate water supplies, including recycled water, for existing and future demands, in normal, single-dry and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

Additionally, newly passed State legislation, Senate Bill 7 of Special Extended Session 7 (SBX7-7), was signed into law in November 2009, which calls for progress towards a 20 percent reduction in per capita water use statewide by 2020. As a result, the legislation now mandates each urban retail supplier to develop and report a water use target in the retailer's 2010 UWMP. The legislation further requires that retailers report an interim 2015 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates.

SBX7-7 provides four possible methods for an urban retail water supplier to use to calculate its water use target. The California Department of Water Resources (DWR) has also developed methodologies for calculating base daily per capita water use; baseline commercial, industrial and institutional water use; compliance daily per capita water use; gross water use; service area population; indoor residential water use and landscape area water use.

Also of importance is Assembly Bill (AB) 1420. AB 1420, passed in 2007 and in effect as of January 2009, changes the funding eligibility requirements of Section 10631.5 of the Water Code. For any urban water supplier to be eligible for grant or loan funding administered by DWR, the State Water Resources Control Board (SWRCB) or the Bay-Delta Authority (such as those funding programs Propositions 50 and 84), the supplier must show implementation of water use efficiency demand management measures/best management practices (DMMs/BMPs) listed and described in the Act and the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), or show the schedules and budgets by which the supplier will begin implementing the DMMs/BMPs. Any supplier not implementing the measures based on cost-effectiveness must submit proof showing why the measures are not cost-effective. Tables ensuring compliance with AB 1420 are provided in Appendix E.

TABLE 3-1
SUMMARY OF CURRENT AND PLANNED WATER SUPPLIES AND BANKING PROGRAMS[a]

		2010	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies										
Existing Groundwater[b]										
Alluvial Aquifer		24,385	24,000	24,000	24,000	25,000	25,000	25,000	25,000	25,000
Saugus Formation[c]		6,725	9,225	10,225	10,225	10,225	10,225	10,225	10,225	10,225
	Total Groundwater	**31,110**	**33,225**	**34,225**	**34,225**	**35,225**	**35,225**	**35,225**	**35,225**	**35,225**
Recycled Water[d]	**Total Recycled**	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**
Imported Water										
State Water Project[e]		58,300	58,100	57,900	57,600	57,400	57,400	57,400	57,400	57,400
Flexible Storage Accounts[f]		6,060	6,060	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Buena Vista-Rosedale		11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land		1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
	Total Imported	**76,967**	**76,767**	**75,187**	**74,887**	**74,687**	**74,687**	**74,687**	**74,687**	**74,687**
Existing Banking Programs[g]										
Rosedale Rio-Bravo		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Semitropic		15,000	15,000	15,000	-	-	-	-	-	-
Semitropic - Newhall Land		4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
	Total Banking	**39,950**	**39,950**	**39,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**
Planned Supplies										
Future Groundwater[h]										
Alluvial Aquifer		-	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation		-	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
	Total Groundwater	**-**	**1,375**	**2,375**	**3,375**	**4,375**	**5,375**	**6,375**	**7,375**	**8,375**
Recycled Water[i]	**Total Recycled**	**-**	**975**	**2,725**	**5,225**	**7,775**	**10,275**	**13,775**	**17,275**	**20,975**
Banking Programs	**Total Banking Programs**	**-**	**-**	**-**	**10,000**	**10,000**	**20,000**	**20,000**	**20,000**	**20,000**

Notes:

(a) The values shown under "Existing Supplies" and "Planned Supplies" are projected to be available in average/normal years. The values shown under "Existing Banking Programs" and "Planned Banking Programs" are the maximum capacity of program withdrawals.

(b) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(c) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(d) Represents recycled water being delivered in 2010 with existing facilities. CLWA currently has 1,700 AFY under contract.

(e) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report.*"

(f) Includes both CLWA and Ventura County entities flexible storage accounts. Initial term of agreement with Ventura County entities expires after 2015.

(g) Supplies shown are annual amounts that can be withdrawn and would typically be used only during dry years.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production remains within the sustainable ranges identified in Table 3-8 of 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-10, existing and planned groundwater pumping remain within the basin operating plan shown on Table 3- 5.

(i) See Table 4-3. Total Purveyor Recycled Water less Existing Recycled Supply.

TABLE 3-3
HISTORICAL IMPORTED SUPPLY DELIVERIES (AF)

Year	SWP Deliveries to CLWA Service Area[a]	SWP Deliveries to Out-of-Service Area Storage[b]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to CLWA Service Area[c]	Total Imported Supplies to CLWA Service Area
1980	1,210	-	-	-	1,210
1981	5,761	-	-	-	5,761
1982	9,516	-	-	-	9,516
1983	9,476	-	-	-	9,476
1984	11,477	-	-	-	11,477
1985	12,401	-	-	-	12,401
1986	13,928	-	-	-	13,928
1987	16,167	-	-	-	16,167
1988	18,904	-	-	-	18,904
1989	21,719	-	-	-	21,719
1990	22,139	-	-	-	22,139
1991	7,357	-	-	-	7,357
1992	14,812	-	-	-	14,812
1993	13,787	-	-	-	13,787
1994	14,919	-	-	-	14,919
1995	17,747	-	-	-	17,747
1996	18,448	-	1,256	-	19,704
1997	21,586	1,256	-	-	21,586
1998	19,782	-	-	-	19,782
1999	28,813	-	-	-	28,813
2000	31,085	-	2,589	-	33,674
2001	35,632	2,589	-	-	35,632
2002	42,080	24,000	395	-	42,475
2003	44,967	-	-	-	44,967
2004	47,463	32,522	-	-	47,463
2005	36,747	20,000	-	-	36,747
2006	39,622	20,395	-	-	39,622
2007	34,919	8,200	-	11,000	45,919
2008	31,878	-	-	11,000	42,878
2009	26,096	-	1,650	11,000	38,746

Sources: DWR Bulletin 132, Management of the California State Water Project; and DWR delivery files.

Notes:

(a) Includes deliveries of Table A supplies, carryover water, Article 21 water, Turnback Pool water, local supply (from West Branch reservoirs) and water purchased through DWR.

(b) Out-of-service area storage includes flexible storage in Castaic Lake, the Semitropic Banking Program and the Rosedale-Rio Bravo Banking Program.

(c) Deliveries from Buena Vista-Rosedale.

as the banking partner, or used by the farmers in exchange for their surface water allocations, which would be delivered to CLWA as the banking partner through the California Aqueduct.

CLWA is a partner in two existing groundwater banking programs, the Semitropic Banking Program and RRBWSD Banking Program, discussed below in Sections 3.5.1 and 3.5.2, respectively. Newhall Land is also a partner in the Semitropic Banking Program, as discussed in Section 3.5.3, with its supplies assumed to be available to VWC. In addition, CLWA has updated its plan to enhance its overall supply reliability, including the need for additional banking programs, as discussed in Section 3.5.4.

3.5.1 Semitropic Banking Program

Semitropic Water Storage District (Semitropic) provides SWP water to farmers for irrigation. Semitropic is located in the San Joaquin Valley in the northern part of Kern County immediately east of the California Aqueduct. Using its available groundwater storage capacity (approximately one MAF), Semitropic has developed a groundwater banking program, that takes available SWP supplies in wet years and returns the water in dry years. As part of this dry-year return, Semitropic can leave its SWP water in the Aqueduct for delivery to a banking partner and increase its groundwater production for its farmers. Semitropic constructed facilities so that groundwater can be pumped into a Semitropic canal and, through reverse pumping plants, be delivered to the California Aqueduct. Semitropic currently has six long-term first priority banking partners: the Metropolitan Water District of Southern California (Metropolitan), Santa Clara Valley Water District, Alameda County Water District, Alameda County Flood Control and Water Conservation District Zone 7, Vidler Water Company and Newhall Land and Farming. The total amount of storage under contract is approximately one MAF.

In 2002, CLWA entered into a temporary storage agreement with Semitropic, and stored an available portion of its Table A supply (24,000 AF) in an account in Semitropic's program. In 2004, 32,522 AF of available 2003 Table A supply was stored in a second temporary Semitropic account. In accordance with the terms of CLWA's storage agreements with Semitropic, 90 percent of the banked amount, or a total of 50,870 AF, was recoverable through 2013 to meet CLWA water demands when needed. Each account had a term of ten years for the water to be withdrawn and delivered to CLWA.[19] Of this recoverable storage, 4,950 AF has been withdrawn, with 1,650 AF delivered in 2009 and 3,300 AF delivered in 2010, leaving a balance of 45,920 AF in storage available to meet future CLWA needs. CLWA executed an amendment for a ten-year extension of each banking agreement with Semitropic in April 2010. A negative declaration for the program extension was approved by CLWA's Board of Directors on January 19, 2011 and by the Semitropic Board of Directors on April 6, 2011.

Current operational planning includes use of the water stored in Semitropic for dry-year supply. Accordingly, it is reflected in the available supplies delineated in this section, and it is also reflected as contributing only to dry-year supply reliability in Chapter 6, through 2023.

3.5.2 Rosedale-Rio Bravo Banking Program

Also located in Kern County, immediately adjacent to the Kern Water Bank, RRBWSD has developed a Water Banking and Exchange Program. CLWA has entered into a long-term agreement with RRBWSD that provides it with storage and pumpback capacity of 20,000 AFY,

[19] Thereafter, the remaining amount of project water would be forfeited from the account.

with up to 100,000 AF of storage capacity. CLWA began storing water in this program in 2005 and has since reached the program's maximum storage capacity, with 100,000 AF currently available for withdrawal.

This project is a water management program to improve the reliability of CLWA's existing dry-year supplies; it is not an annual supply that could support growth. Accordingly, it is reflected in the available supplies delineated in this section and it is also reflected as contributing only to dry-year supply reliability in Chapter 6.

3.5.3 Semitropic Banking Program – Newhall Land

As mentioned above, one of Semtropic's long-term groundwater banking partners is Newhall Land. In its agreement with Semitropic, Newhall Land has available to it a pumpback capacity of 4,950 AFY and a storage capacity of 55,000 AF. Newhall Land has a current storage balance of 18,828 AF. This supply is assumed to be available to VWC and is planned to be used only in dry years. Accordingly, it is reflected in the available supplies delineated in this section, and it is also reflected as contributing only to dry-year supply reliability in Chapter 6.

3.5.4 Other Opportunities

In 2003, CLWA produced a Water Supply Reliability Plan (Reliability Plan), and updated it in 2009. The Reliability Plan outlines primary elements that CLWA should include in its water supply mix to obtain maximum overall supply reliability enhancement. These elements include both conjunctive use and groundwater banking programs, which enhance the reliability of both the existing and future supplies, as well as water acquisitions. The Reliability Plan recommends water banking storage and pumpback capacity north and south of Tehachapi Mountains, the latter of which would provide an emergency supply in case of catastrophic outage along the California Aqueduct. The Reliability Plan also contains a recommended implementation plan and schedule. CLWA has made significant progress on its water supply reliability program, obtaining storage capacity in two banking programs north of the Tehachapi Mountains, with approximately 146,000 AF of water currently banked in those programs and available for withdrawal. Negotiations with one program south of the Tehachapis were initiated, but identification of a program for emergency outage storage remains ongoing.

The 2009 update of the Reliability Plan presents the implementation schedule recommended for both storage and pumpback capacity beginning in 2010 and incrementally increasing through 2050. CLWA's plans call for development of additional groundwater banking programs, with pumpback capacity of at least an additional 10,000 AF by 2025, and a second additional 10,000 AF by 2035. Table 3-13 summarizes CLWA's future reliability enhancement programs.

TABLE 3-13
FUTURE RELIABILITY ENHANCEMENT PROGRAMS

		Proposed Quantities (AF)		
Project Name	Year Available	Average/ Normal Year	Single Dry Year[a]	Multiple Dry Years[b]
Additional Planned Banking Programs	2025	0	10,000	7,500
	2035	0	20,000	15,000

Notes:
(a) Supplies shown are maximum annual withdrawal capacity.
(b) Supplies shown are average withdrawals during four consecutive dry years.

facilities that are completed would increase SWP reliability beyond the values used throughout this Plan.

6.3.3.1 Flexible Storage Account

Under the Water Supply Contracts with DWR for SWP water, the contractors that share in the repayment of Castaic Lake may access a portion of the storage in that reservoir. This accessible storage is referred to as "flexible storage." The contractors may withdraw water from flexible storage, in addition to their allocated Table A supplies, on an as-needed basis. A contractor must replace any water it withdraws from this storage within five years. As one of the three contractors sharing in the repayment of Castaic Lake, CLWA has access to this flexible storage. Its share of the total flexible storage is currently 4,684 AF. After negotiations with Ventura County water agencies in 2005, CLWA gained access to their 1,376 AF of flexible storage for ten years through 2015. While it is expected that CLWA and Ventura County will extend the existing flexible storage agreement beyond the 2015 term, in this Plan it is not assumed to be available beyond 2015.

CLWA plans to use this supply only in dry years. For the single-dry year condition, it was assumed the entire amount would be used. For the multiple-dry year condition, it was assumed that the entire amount would be used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total. Any water withdrawn was assumed to be replaced in intervening average and wet years and would be available again for use in the next dry year.

6.3.4 Buena Vista-Rosedale

BVWSD and RRBWSD, both member districts of KCWA, have jointly developed a program that provides both a firm water supply of 11,000 AFY and a water banking component. This supply program provides a firm annual water supply available every year based on existing and long-standing Kern River water rights, which is delivered by exchange of Buena Vista's and Rosedale's SWP Table A supplies.

6.3.5 Nickel Water - Newhall Land

This supply is similar to Buena Vista-Rosedale supply both in regard to its source (Kern River water rights) and level of reliability. The supply from this program is up to 1,607 AFY of firm supply, which is available in every year. It was acquired by the developer of the Newhall Ranch project to supplement groundwater and recycled water sources of supply for that project, which is in the CLWA service area. In this Plan, it is anticipated that this water supply will be available to VWC.

6.3.6 Semitropic Banking Program

In 2002, CLWA stored 24,000 AF of its allocated SWP Table A supply through a groundwater banking agreement with Semitropic. In 2004, CLWA stored 32,522 AF of its 2003 allocated SWP Table A supply in a second Semitropic storage account. Under the terms of those agreements, and after consideration for losses within the groundwater basin, CLWA could withdraw up to 50,870 AF when needed within ten years of when the water was stored. Of this storage, CLWA withdrew 4,950 AF in 2009 and 2010, leaving 45,920 AF currently available for

withdrawal. CLWA executed an amendment for a ten-year extension of each banking agreement with Semitropic in April 2010.

In addition to this short-term storage for CLWA, Semitropic has a long-term groundwater banking program with several other partners. The facilities that Semitropic may use in the return of CLWA's banked water supply are the same facilities that Semitropic may use to return banked water to its long-term banking program partners. As a result, there may be competition for use of those facilities in a particularly dry year, which could limit CLWA's ability to access the water in that year.

CLWA plans to use this supply only in dry years. For the single dry year, it was assumed that competition among Semitropic's banking partners for use of return facilities would limit CLWA's supply to about one third of the storage available, or about 15,000 AF. For the multiple-dry year period, it was assumed that the entire amount would be accessible and used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total available, or about 11,500 AF. Under the agreements for this program, including the agreement for the ten-year time extension, the stored water must be withdrawn within twenty years of when it was stored. Therefore, it was assumed that this supply is available only through 2023.

6.3.7 Semitropic Banking Program - Newhall Land

As was the case for the Nickel water, the banking program was entered into by the developer of the Newhall Ranch project to firm up the reliability of the water supply for the project, which is in the CLWA service area. The storage capacity of this program is 55,000 AF. Newhall Land currently has 18,892 AF stored in this program. It is anticipated that this supply will be available to VWC.

VWC plans to use this supply only in dry years. For the single-dry year, supplies were assumed at the program's maximum withdrawal capacity of 4,950 AFY. For the multiple-dry year period, supplies in each year of the dry period were assumed at the program's maximum withdrawal capacity of 4,950 AFY and that additional supplies would be banked during wetter years to allow withdrawal of this amount.

6.3.8 Rosedale-Rio Bravo Banking Program

RRBWSD has also developed a water banking and exchange program. CLWA has entered into a long-term agreement with RRBWSD which provides it with storage and withdrawal capacity of 20,000 AFY and up to 100,000 AF of storage capacity. Withdrawals from the program can be made by exchange of Rosedale's SWP Table A supply, or by pumpback into the California Aqueduct. CLWA began storing water in this program in 2005 and has since reached the program's maximum storage capacity, with 100,000 AF currently available for withdrawal.

CLWA plans to use this supply only in dry years. For the single-dry year, supplies were assumed at the program's maximum withdrawal capacity of 20,000 AF. For the multiple-dry year period, it was assumed that supplies would average at least 15,000 AFY over the dry period and that additional supplies would be banked during wetter years to allow withdrawal of at least this amount.

6.3.9 Additional Planned Banking

CLWA's 2009 update of its Reliability Plan identifies a need for additional banking programs to firm up the dry-year reliability of service area supplies, and includes an implementation schedule to increase both storage and pumpback capacity beginning in 2010 and incrementally increasing through 2050. While a specific banking program has not yet been identified, CLWA's plans call for development of additional groundwater banking programs with pumpback capacity of at least an additional 10,000 AF by 2025, and a second additional 10,000 AF by 2035. For the single-dry year, supplies were assumed at the programs' pumpback capacity. For the multiple-dry year period, it was assumed that supplies would average at least 75 percent of the pumpback capacity over the dry period.

6.4 Supply and Demand Comparisons

The available supplies and water demands for CLWA's service area were analyzed to assess the region's ability to satisfy demands during three scenarios: a normal water year, single-dry year and multiple-dry years. The tables in this section present the supplies and demands for the various drought scenarios for the projected planning period of 2015-2050 in five year increments. The available supplies and water demands broken down by purveyor during the same three scenarios were also analyzed over the project planning period, and these tables are provided in Appendix C. Table 6-1 presents the base years for the development of water year data. Tables 6-2, 6-3 and 6-4 at the end of this section summarize, respectively, Normal Water Year, Single-Dry Water Year and Multiple-Dry Year supplies.

The reader is referred to Chapter 2 for development of retail purveyor demands and current and projected water supplies are developed in Chapters 3 and 4.

TABLE 6-1
BASIS OF WATER YEAR DATA

Water Year Type	Base Years	Historical Sequence
Normal Water Year	Average	1922-2003
Single-Dry Water Year	1977	--
Multiple-Dry Water Years	1931-1934	--

6.4.1 Normal Water Year

Table 6-2 summarizes the water suppliers' supplies available to meet demands over the 40-year planning period during an average/normal year. As presented in the table, the water suppliers' water supply is broken down into existing and planned water supply sources, including wholesale (imported) water, local supplies and banking programs. Demands are shown with and without the urban demand reduction resulting from SBX7-7 conservation objectives.

See Appendix C for the breakdown by purveyor of supplies available to meet demands over the 40-year planning period during an average/normal year.

TABLE 6-2
PROJECTED AVERAGE/NORMAL YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	24,000	24,000	24,000	25,000	25,000	25,000	25,000	25,000
Saugus Formation[b]	9,225	10,225	10,225	10,225	10,225	10,225	10,225	10,225
Total Groundwater	**33,225**	**34,225**	**34,225**	**35,225**	**35,225**	**35,225**	**35,225**	**35,225**
Recycled Water[c]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[d]	58,100	57,900	57,600	57,400	57,400	57,400	57,400	57,400
Flexible Storage Accounts	-	-	-	-	-	-	-	-
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**70,707**	**70,507**	**70,207**	**70,007**	**70,007**	**70,007**	**70,007**	**70,007**
Banking Programs[e]								
Rosedale Rio-Bravo	-	-	-	-	-	-	-	-
Semitropic	-	-	-	-	-	-	-	-
Semitropic - Newhall Land	-	-	-	-	-	-	-	-
Total Banking	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Existing Supplies	**104,257**	**105,057**	**104,757**	**105,557**	**105,557**	**105,557**	**105,557**	**105,557**
Planned Supplies								
Future Groundwater[f]								
Alluvial Aquifer	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
Total Groundwater	**1,375**	**2,375**	**3,375**	**4,375**	**5,375**	**6,375**	**7,375**	**8,375**
Recycled Water[c]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[e]	-	-	-	-	-	-	-	-
Total Planned Supplies	**2,350**	**5,100**	**8,600**	**12,150**	**15,650**	**20,150**	**24,650**	**29,350**
Total Existing and Planned Supplies	**106,607**	**110,157**	**113,357**	**117,707**	**121,207**	**125,707**	**130,207**	**134,907**
Demand w/o Conservation[g]	80,070	88,484	96,898	105,312	113,726	122,140	130,554	138,968
20x2020 Reduction[h]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[i]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[j]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[k]	**72,343**	**71,908**	**80,236**	**88,564**	**96,892**	**105,220**	**113,549**	**121,877**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(b) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(c) Recycled water projections from Table 4-3.

(d) SWP supplies are based on the Department of Water Resources "2009 State Water Project Delivery Reliability Report."

(e) Not needed in average/normal years.

(f) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3- 5.

(g) Demand w/o Conservation data from Table 2-2.

(h) 20x2020 Reduction for the Region from Table 2-22.

(i) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.

(j) Reduction from Water Conservation calculation for Region from Table 2-22.

(k) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

TABLE 6-3
PROJECTED SINGLE-DRY YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	20,300	20,250	20,200	21,050	21,050	21,025	21,000	20,650
Saugus Formation	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400
Total Groundwater	**40,700**	**40,650**	**40,600**	**41,450**	**41,450**	**41,425**	**41,400**	**41,050**
Recycled Water[b]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[c]	11,900	11,000	10,000	9,100	9,100	9,100	9,100	9,100
Flexible Storage Accounts[d]	6,060	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**30,567**	**28,287**	**27,287**	**26,387**	**26,387**	**26,387**	**26,387**	**26,387**
Banking Programs								
Rosedale Rio-Bravo[e]	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Semitropic[f]	15,000	15,000	-	-	-	-	-	-
Semitropic - Newhall Land[g]	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
Total Banking	**39,950**	**39,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**
Total Existing Supplies	**111,542**	**109,212**	**93,162**	**93,112**	**93,112**	**93,087**	**93,062**	**92,712**
Planned Supplies								
Future Groundwater[h]								
Alluvial Aquifer	200	1,250	2,300	3,850	4,850	5,875	6,900	7,750
Saugus Formation (Restored Well)	825	3,777	3,777	3,777	3,777	3,777	3,777	3,750
Saugus Formation (New Wells)	2,875	9,923	9,923	9,923	9,923	9,923	9,923	9,950
Total Groundwater	**3,900**	**14,950**	**16,000**	**17,550**	**18,550**	**19,575**	**20,600**	**21,450**
Recycled Water[b]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[i]	-	-	10,000	10,000	20,000	20,000	20,000	20,000
Total Planned Supplies	**4,875**	**17,675**	**31,225**	**35,325**	**48,825**	**53,350**	**57,875**	**62,425**
Total Existing and Planned Supplies	**116,417**	**126,887**	**124,387**	**128,437**	**141,937**	**146,437**	**150,937**	**155,137**
Demand w/o Conservation[j]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
20x2020 Reduction[k]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[l]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[m]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[n]	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5. SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(b) Recycled water projections from Table 4-3.

(c) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report.*"

(d) Includes both CLWA and Ventura County entities flexible storage accounts. Initial Term of agreement with Ventura County entities expires after 2015.

(e) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(f) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(g) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1977 single dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(i) Includes banking programs with 10,000 AF of additional pumpback capacity by 2025 and a second additional 10,000 AF by 2035.

(j) Demand w/o Conservation data from Table 2-2. Includes a 10 percent increase in demand during dry years.

(k) 20x2020 Reduction for the Region from Table 2-22.

(l) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.

(m) Reduction from Water Conservation calculation for Region from Table 2-22.

(n) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

TABLE 6-4
PROJECTED MULTIPLE-DRY YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	20,425	20,425	20,425	21,825	21,825	21,825	21,825	21,325
Saugus Formation	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700
Total Groundwater	**40,125**	**40,125**	**40,125**	**41,525**	**41,525**	**41,525**	**41,525**	**41,025**
Recycled Water[b]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[c]	32,900	32,900	33,000	33,000	33,000	33,000	33,000	33,000
Flexible Storage Accounts[d]	1,510	1,170	1,170	1,170	1,170	1,170	1,170	1,170
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**47,017**	**46,677**	**46,777**	**46,777**	**46,777**	**46,777**	**46,777**	**46,777**
Banking Programs								
Rosedale Rio-Bravo[e]	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Semitropic[f]	11,500	11,500	-	-	-	-	-	-
Semitropic - Newhall Land[g]	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
Total Banking	**31,450**	**31,450**	**19,950**	**19,950**	**19,950**	**19,950**	**19,950**	**19,950**
Total Existing Supplies	**118,917**	**118,577**	**107,177**	**108,577**	**108,577**	**108,577**	**108,577**	**108,077**
Planned Supplies								
Future Groundwater[h]								
Alluvial Aquifer	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation (Restored Well)	2,375	1,625	1,500	1,400	1,275	1,125	1,000	875
Saugus Formation (New Wells)	2,250	10,325	10,450	10,550	10,675	10,825	10,950	11,075
Total Groundwater	**4,625**	**12,950**	**13,950**	**14,950**	**15,950**	**16,950**	**17,950**	**18,950**
Recycled Water[b]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[i]	-	-	7,500	7,500	15,000	15,000	15,000	15,000
Total Planned Supplies	**5,600**	**15,675**	**26,675**	**30,225**	**41,225**	**45,725**	**50,225**	**54,925**
Total Existing and Planned Supplies	**124,517**	**134,252**	**133,852**	**138,802**	**149,802**	**154,302**	**158,802**	**163,002**
Demand w/o Conservation[j]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
20x2020 Reduction[k]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[l]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[m]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[n]	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5. SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(b) Recycled water projections from Table 4-3.

(c) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report.*"

(d) Includes both CLWA and Ventura County entities flexible storage accounts. Initial Term of agreement with Ventura County entities expires after 2015.

(e) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(f) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(g) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1931-1934 multiple dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(i) Includes banking programs with 10,000 AF of additional pumpback capacity by 2025 and a second additional 10,000 AF by 2035.

(j) Demand w/o Conservation data from Table 2-2. Includes a 10 percent increase in demand during dry years.

(k) 20x2020 Reduction for the Region from Table 2-22.

(l) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.

(m) Reduction from Water Conservation calculation for Region from Table 2-22.

(n) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

TABLE 8-2
PER CAPITA HEALTH AND SAFETY WATER QUANTITY CALCULATIONS

	Non-Conserving Fixtures		Habit Changes		Conserving Fixtures	
Toilets	5 flushes x 5.5 gpf =	27.5	3 flushes x 5.5 gpf =	16.5	5 flushes x 1.6 gpf =	8.0
Showers	5 min x 4.0 gpm =	20.0	4 min x 3.0 gpm =	12.0	5 min x 2.0 gpm =	10.0
Washers	12.5 GPCD (1/3 load) =	12.5	11.5 GPCD (1/3 load) =	11.5	11.5 GPCD (1/3 load) =	11.5
Kitchens	4 GPCD =	4.0	4 GPCD =	4.0	4 GPCD =	4.0
Other	4 GPCD =	4.0	4 GPCD =	4.0	4 GPCD =	4.0
Total GPCD		68.0		48.0		37.5
CCF per capita per year		33.0		23.0		18.0

8.4 Minimum Water Supply Available During Next Three Years

The minimum water supply available during the next three years would occur during a three-year multiple-dry year event between the years 2011 and 2013. As shown in Table 8-3, the total water supply available during each of the next three years is about 128,400 AFY. When comparing these supplies to the demand projections provided in Chapter 2 of this Plan, CLWA and the purveyors have adequate supplies available to meet projected demands should a multiple-dry year period occur during the next three years.

TABLE 8-3
ESTIMATE OF MINIMUM SUPPLY FOR THE NEXT THREE YEARS

Source	Supply (AF) 2011	2012	2013
Wholesale (Imported)			
SWP Table A Supply[a]	30,700	30,700	30,700
Buena Vista-Rosedale	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607
Flexible Storage Account (CLWA)[b]	1,560	1,560	1,560
Flexible Storage Account (Ventura County)[b]	460	460	460
Total Imported Supplies	*45,327*	*45,327*	*45,327*
Local Supplies			
Groundwater Supplies			
Alluvial Aquifer[c]	20,425	20,425	20,425
Saugus Formation[c]	19,700	19,700	19,700
Recycled Water	325	325	325
Total Local Supplies	*40,450*	*40,450*	*40,450*
Banking Programs			
Semitropic Water Bank[d]	15,300	15,300	15,300
Rosedale-Rio Bravo[e]	20,000	20,000	20,000
Semitropic Water Bank - Newhall Land[e]	4,950	4,950	4,950
Total Banking Programs	*40,250*	*40,250*	*40,250*
Total Supplies	**126,027**	**126,027**	**126,027**

Notes:
(a) SWP supplies to CLWA based on detailed delivery results provided by DWR from the analyses presented in DWR's *2009 SWP Delivery Reliability Report*, for the worst case three-year dry period of 1990-1992. SWP deliveries to CLWA over this three year period average 32% of CLWA's 95,200 AF of Table A Amount.
(b) Based on total amount of storage available divided by 3 (3-year dry period).
(c) Based on existing groundwater supplies available during a multiple-dry year period.
(d) Based on total amount of water currently in storage (45,920 AF) divided by 3 (3-year dry period).
(e) Based on maximum annual pumpback capacity.

8.5.3 Recommendations for Emergency Storage

The various outage scenarios described in Section 8.5.2 highlight the benefit of CLWA having water stored in multiple banking programs south of the Delta. Banking programs located in Kern County, which have access to the California Aqueduct, are ideally suited to meet at least part of CLWA's emergency needs. The worst-case scenario described above (a complete disruption on the West Branch of the aqueduct) demonstrates the desirability that CLWA also has water stored in at least one water banking program geographically located south of the Tehachapi Mountains.

Storage located south of the Tehachapi Mountains may necessitate an exchange agreement with another West Branch contractor so that the contractor could be served from CLWA's banked water, and CLWA could be served by a portion of the contractor's water in Pyramid or Castaic Lake (this worst case scenario also assumes that CLWA has access to its full Flexible Storage Account in Castaic Lake, in addition to emergency storage).

The most likely and utilizable arrangement would be with the Metropolitan Water District, which retains a significant portion of the storage capacity in Castaic Lake. CLWA could store varying amounts of its water in groundwater storage or banking programs within or adjacent to Metropolitan's service area. In the event of an outage or other emergency, Metropolitan would serve its customers with CLWA's stored water and CLWA would serve its customers with a like amount of Metropolitan's water in Castaic Lake. Amounts of storage required and locations of potential banking programs are as follows:

- Emergency outage storage capacity: 5,000 AF of storage capacity in 2010, increasing to approximately 14,000 AF by 2050.
- Emergency pumpback capacity: approximately 1,000 AF per month of pumpback capacity in 2010, increasing to 2,300 AF per month by 2050.

Potential banking programs, where CLWA could be served by a portion of the contractor's water in Pyramid or Castaic Lake for a potential exchange of emergency outage storage include the following locations:

- **Semitropic-Rosamond Water Bank Authority**
  - This project is located in eastern Kern County, in the northern portion of the Antelope Valley. It is adjacent to both the East Branch of the California Aqueduct and the Los Angeles Aqueduct. This program is active and is seeking participants.
- **Antelope Valley-East Kern Water Agency Water Supply Stabilization Program and Groundwater Recharge Project**
  - This is a project proposed by the Antelope Valley-East Kern Water Agency (AVEK), a SWP wholesaler located in the Antelope Valley area of southeastern Kern County and northern Los Angeles County. The project is adjacent to the East Branch of the California Aqueduct. AVEK is conducting the environmental analysis for the proposed project.
- **Calleguas Municipal Water District Las Posas Groundwater Recharge Project**
  - This project is an in-lieu and Aquifer Storage and Recovery project located in central Ventura County, within the service area of Metropolitan. CLWA could purchase or store water in the program and in the event of an emergency outage, would

PROJECT JUSTIFICATION

This attachment provides the project justification for the various Projects contained in this Proposal. This Attachment is organized as follows:

Project Summary Table – A table showing how each Project meets the various drought elements and IRWM Project Elements of the drought Solicitation. This table is consistent with PSP Table 4.

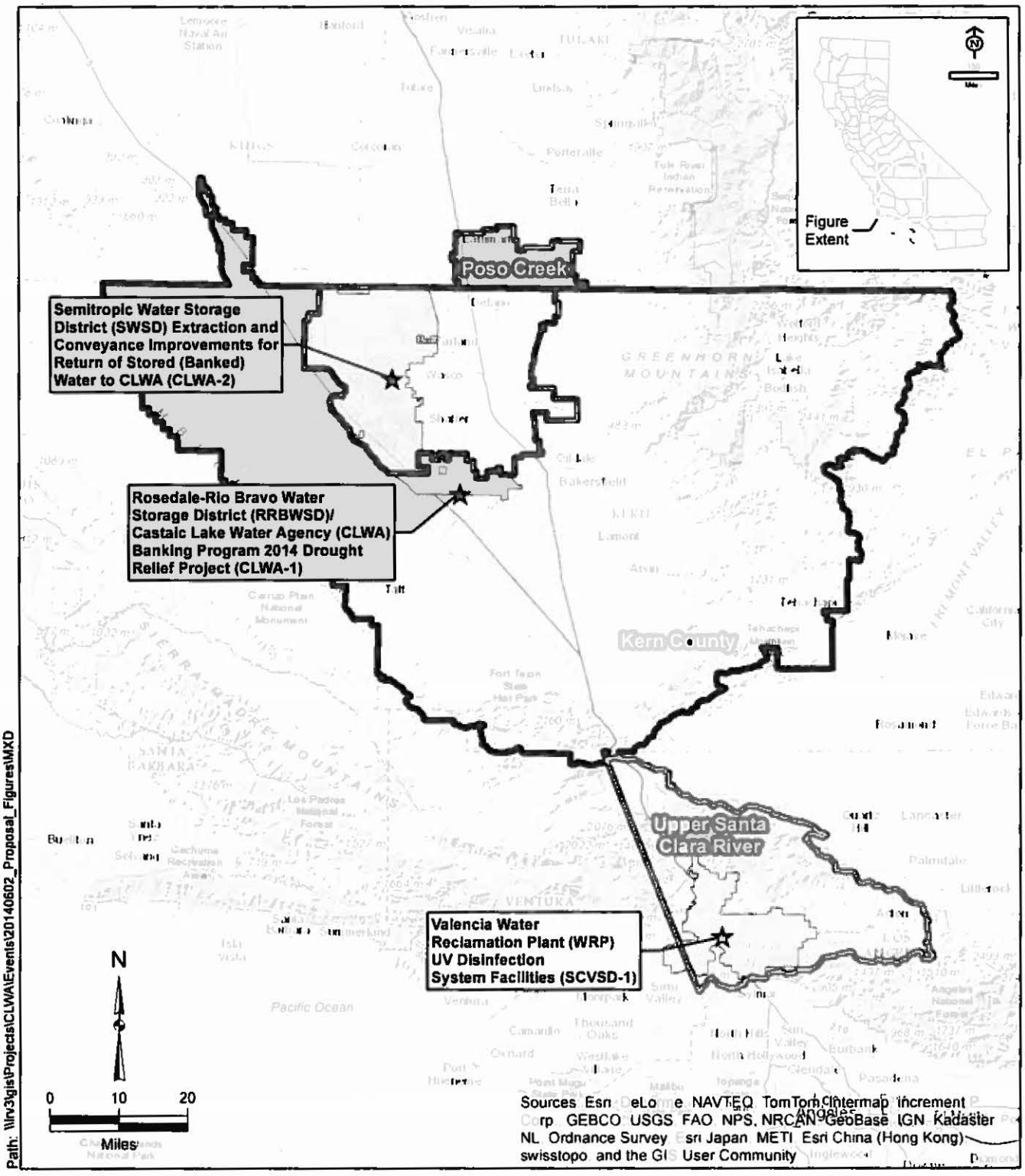
Project Description - A brief Project summary and description of how each Project will help alleviate the drought impact in the Region

Project Specific Information - The Project description, a description of Project physical benefits, the technical analysis of physical benefits claimed, and cost-effectiveness analysis for each Project.

Regional and Project Maps - An illustration of the IRWM regional boundary and the location of each Project is shown on Figure 1 (Page 3-3) as well as a map for each Project (Figures 2, 3, and 4) (Pages 3-5, 3-7, 3-9).

Project Summary Table

Table 4 – 2014 IRWM Drought Solicitation Project Summary Table				
	Drought Project Element	RRBWSD/CLWA Banking Program 2014 Drought Relief Project	SWSD Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA	Valencia WRP UV Disinfection System Facilities Project
D.1	Provide immediate regional drought preparedness	X	X	
D.2	Increase local water supply reliability and the delivery of safe drinking water	X	X	
D.3	Assist water suppliers and regions to implement conservation programs and measures that are not locally cost-effective			
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought	X	X	X
	IRWM Project Element			
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X	
IR.2	Stormwater capture, storage, clean-up, treatment, and management			
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands			
IR.4	Non-point source pollution reduction, management, and monitoring			
IR.5	Groundwater recharge and management projects	X	X	
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users			X
IR.7	Water banking, exchange, reclamation, and improvement of water quality	X	X	X
IR.8	Planning and implementation of multipurpose flood management programs			
IR.9	Watershed protection and management			
IR.10	Drinking water treatment and distribution			
IR.11	Ecosystem and fisheries restoration and protection			



Legend

- Project Location
- **IRWM Regions**
  - Kern County
  - Poso Creek
  - Upper Santa Clara River
- **Water District**
  - RRBWSD
  - SWSD
  - CLWA

Kennedy/Jenks Consultants

Castaic Lake Water Agency
Los Angeles County, California

Regional Map
Overview of Project Locations

K/J 1444213*00
July 2014

Figure 1

Semitropic Water Storage District (SWSD) Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA

This Project is being implemented by the Semitropic Water Storage District (SWSD) and CLWA.

Project Description

This Project will construct well, transmission and recharge facilities in the SWSD service area in order to provide the CLWA banking program extraction and return capacity of 5,000 AFY.

Alleviation of Drought Impacts

Ongoing drought conditions have caused the CLWA's wholesale water supplies to become increasingly constrained and CLWA is facing difficulties in meeting projected water demands in future years with currently available recovery of banked water supplies. Approximately half of urban water demand is met with imported SWP water, however due to allocation reductions CLWA cannot depend on these supplies to meet demands without more access to its banked supplies.

SWP allocations are far below projected allocations for single- and multiple-dry year scenarios in the CLWA 2010 UWMP. During critical dry year conditions, CLWA is dependent on supplies from long-term groundwater banking programs in which it actively participates. However, due to the statewide drought conditions many agencies are calling on their dry-year banked supplies, thereby creating an intense demand for extraction capacity. As a result, accessing the much needed dry-year supplies is not possible without additional extraction capacity to SWSD/CLWA's banking programs. Additionally, current operating plans for 2015 and 2016 require additional extraction capacity from the SWSD banking program to meet local water demand if the drought persists into those years.

Implementation of this Project will help alleviate these critical drought impacts, by helping to ensure that CLWA's banked supplies can be extracted and delivered. The Agency will acquire shares in the Semitropic Banking Program that will pay for the construction of wells and transmission capacity in order to access to 5,000 AFY in banked supplies required to meet dry year demands.

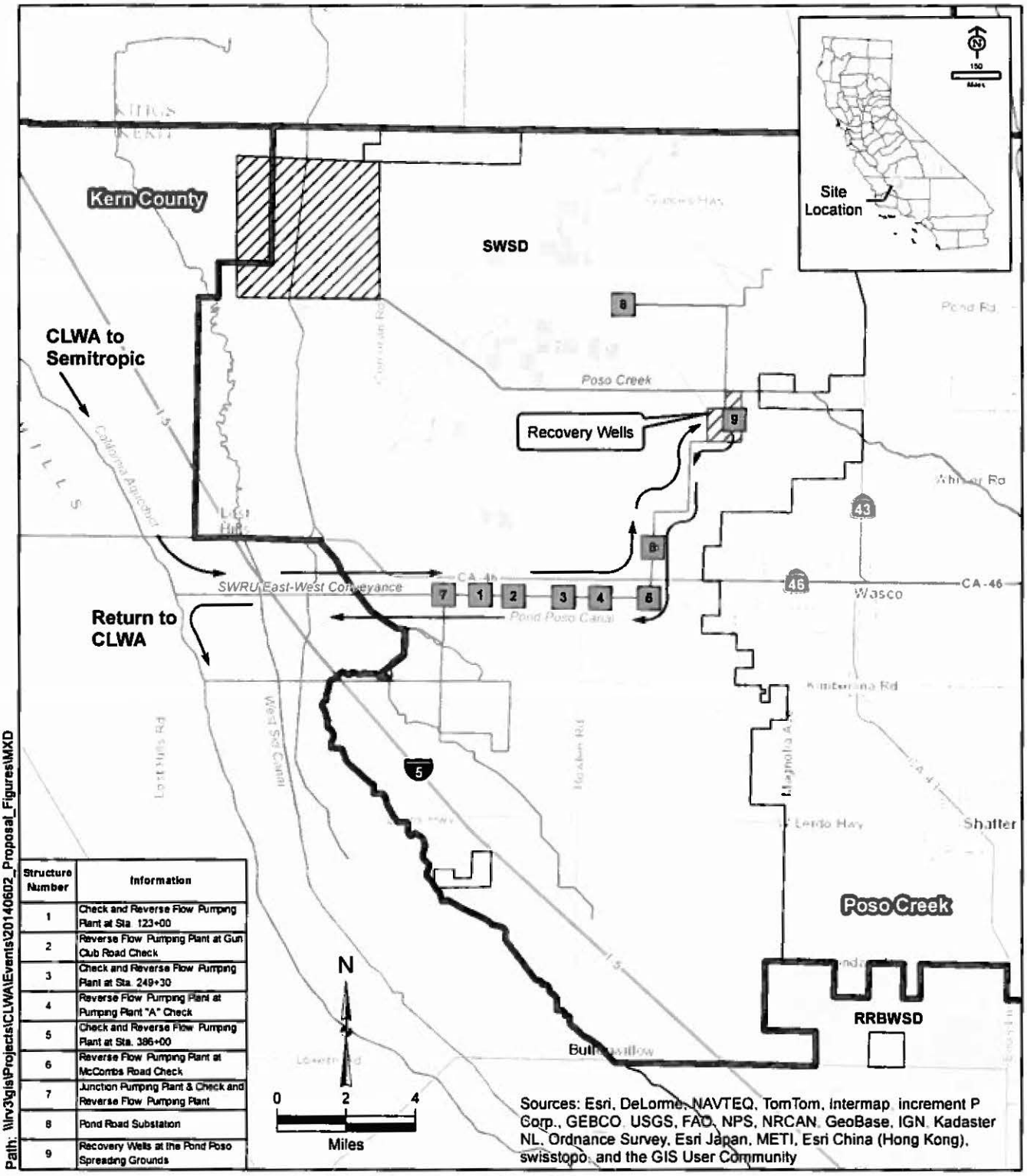
Access to planned supplies and water conservation are critical for meeting demands during dry year conditions. The Santa Clarita Valley (SCV) has implemented a voluntary water conservation program in 2014 to achieve a 20 percent decrease in demand and is preparing to implement more measures to meet the SWRCB requirements. Implementation of this Project will address the water supply side of dry year strategies, to ensure access to previously banked supplies.

Drought Project Type

This Project will provide immediate regional drought preparedness by enabling greater access to banked water supplies in order to meet demands during dry years. Local water supply reliability is considerably increased by having adequate recover of banked water supplies. In addition, this Project enhances overall conjunctive water management relied on in the region for meeting dry year demands in the future. Finally, creating more flexibility for the retrieval of banked supplies can help augment other local water supplies during droughts, thereby potentially reducing impacts to ecosystems dependent on those supplies.

Need for Expedited Funding

In order to have the Project constructed and on-line to access previously stored water supplies and prevent water shortages in 2015 and dry years beyond, the Project needs to be funded in 2014 and constructed in early 2015. No other grant programs are identified at this time that meets both the nature and timing of this Project. CLWA is in the process of making arrangements to access water stored its banking program with SWSD through the use of first priority rights held by Newhall Land. However, this has proven problematic in that costs of the use of this extraction capacity are high, CLWA is expected to provide additional water to the first priority partner, the time to negotiate agreements is lengthy and delays delivery of the water and the availability is not guaranteed in a given year when the banked supplies are needed in the CLWA service area.



Structure Number	Information
1	Check and Reverse Flow Pumping Plant at Sta. 123+00
2	Reverse Flow Pumping Plant at Gun Club Road Check
3	Check and Reverse Flow Pumping Plant at Sta. 249+30
4	Reverse Flow Pumping Plant at Pumping Plant "A" Check
5	Check and Reverse Flow Pumping Plant at Sta. 386+00
6	Reverse Flow Pumping Plant at McCombs Road Check
7	Junction Pumping Plant & Check and Reverse Flow Pumping Plant
8	Pond Road Substation
9	Recovery Wells at the Pond Poso Spreading Grounds

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LEGEND

- Structure
- Electrical Distribution Line
- Water Features
- Kern National Wildlife Refuge
- Spreading Basin

IRWM Regions

- Kern County
- Poso Creek

Water District

- RRBWSD
- SWSD

Kennedy/Jenks Consultants

Castaic Lake Water Agency
Los Angeles County, California

Semitropic Water Storage District (SWSD) Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA

K/J 1444213*00
July 2014
Figure 3

Project Physical Benefits, Technical Justification, and Cost Effectiveness

RRBWSD/CLWA Banking Program 2014 Drought Relief Project (CLWA-1)

The following (quantifiable) physical benefits are expected from this Project:

1. Provide an additional 7,500 acre-feet (AF) of drought year supply
2. Recharge the RRBWSD Banking Program's groundwater aquifer by an additional 7,500 AF during wet years

In addition to the physically quantified benefits expected from this Project, the following non-quantifiable benefit is important to understanding the full value of the Project: the conjunctive use of the groundwater aquifer used in the RRBWSD Banking Program will recharge the basin during wet years, while during dry years, the Project provides a cooperative way to allocate water among several water agencies. In particular, the recharge of the basin will raise groundwater levels, which will provide benefits to farmers in the area such as lowering their pumping costs and enhance the availability of water. The cooperation of the water agencies during dry years will reduce the chances of water agencies not being able to meet their water demands.

Each Project physical benefit is discussed individually below, with an overview of each benefit expected over the project life, followed by a technical analysis of the physical benefit claimed.

A cost effectiveness analysis is provided for the RRBWSD/CLWA Banking Program 2014 Drought Relief Project (CLWA-1) following the Project benefits and technical analysis discussion.

Project Physical Benefits

Benefit 1: Provide an additional 7,500 AF of dry year water supply

As is shown in Table 3-1, with the Project, CLWA will have access to an additional 7,500 AF during dry years with the Project to meet its water demands.

Table 3-1 – Annual Project Physical Benefits (PSP Table 5)
Project Name: RRBWSD/CLWA Banking Program 2014 Drought Relief Project
Type of Benefit Claimed: Reduce the need to obtain 7,500 AF from another source during dry years
Units of the Benefit Claimed : Acre-feet
Additional Information About this Benefit: CLWA will obtain water from the RRBWSD Banking Program during dry years, which are predicted to occur in four years out of every ten

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	0	0	0
2015	5,000	9,500	4,500*
2016	5,000	12,500	7,500
2017	0	0	0
2018	0	0	0
2019	0	0	0
2020	5,000	12,500	7,500
2021	5,000	12,500	7,500
2022	0	0	0
2023	0	0	0
2024	0	0	0

Table 3-1 – Annual Project Physical Benefits (PSP Table 5)

Project Name: RRBWSD/CLWA Banking Program 2014 Drought Relief Project

Type of Benefit Claimed: Reduce the need to obtain 7,500 AF from another source during dry years

Units of the Benefit Claimed : Acre-feet

Additional Information About this Benefit: CLWA will obtain water from the RRBWSD Banking Program during dry years, which are predicted to occur in four years out of every ten

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2025	5,000	12,500	7,500
2026	5,000	12,500	7,500
2027	0	0	0
2028	0	0	0
2029	0	0	0
2030	5,000	12,500	7,500
2031	5,000	12,500	7,500
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	5,000	12,500	7,500

Comments:

* 4,500 represents less than a full year of operation in 2015.

Without the Project, CLWA can obtain approximately 5,000 AF each year from the Project. If CLWA only obtained water in dry years, by 2035, CLWA would have extracted 45,000 AF, indicating that CLWA would forfeit almost 60,000 AF of water that CLWA placed into the RRBWSD Banking Program unless it found an alternative storage facility and move the water when it was not required into the service area.

With the Project, CLWA can obtain 12,500 AF each year from the RRBWSD Banking Program (9,500 AF in 2015 as project construction will not be complete until part way through the year.) If CLWA only obtained water in dry years, by 2035, CLWA would have extracted 109,500 AF, meaning that CLWA would not forfeit any of the water placed into the bank prior to 2014.

Technical Analysis of Physical Benefits Claimed

Benefit 1: Provide an additional 7,500 AF of dry year water supply

The RRBWSD/CLWA Banking Program 2014 Drought Relief Project will increase CLWA's extraction and transmission capacity from the RRBWSD Banking Program by an additional 7,500 acre-feet per year (AFY). The additionally capacity would boost the extraction capacity dedicated to CLWA to approximately 12,500 AFY and nearly meets CLWA's 2010 Urban Water Management Plan (UWMP) for the SCV long-term goal of having 15,000 AFY of extraction capacity from the RRBWSD/CWLA Banking Program. CLWA plans to use this additional extraction and transmission capacity to help meet water needs during drought years, like the current one. Based on the historical 81-year hydrology provided by the SWP, it is assumed that CLWA will call upon its banked supplies for extraction of water in four out of every ten years.

Technical Basis of the Project

The Project will increase the amount of water that CLWA can recover during drought years from the water it has banked with the RRBWSD Banking Program. Currently, CLWA has more than 100,000 AF currently banked in the RRBWSD Banking Program. In order to do this, RRBWSD will construct three additional wells and associated transmission capacity dedicated to CLWA. Each of the wells will have a capacity of 3,000 AFY (RRBWSD, 2014a, pg. 10); although it is assumed that under realistic conditions the three wells will only be able to extract 7,500 AFY collectively. RRBWSD will install, own, and maintain the wells as part of its agreement with CLWA (RRBWSD, 2010, pg. 3, 4), while CLWA will have rights to the wells' extraction capacity and associated transmission capacity (RRBWSD, 2014a, pg. 10).

Recent and Historical Conditions

CLWA has more than 100,000 AF currently banked in the RRBWSD Banking Program. CLWA's 2010 UWMP calls for CLWA to obtain 15,000 AFY from the RRBWSD Banking Program in a single-dry year. However, CLWA only received about 5,000 AF from the RRBWSD Banking Program in 2014 due to extraction and transmission capacity constraints. CLWA's agreement with the RRBWSD Banking Program expires in 2035, and CLWA will forfeit all of their water left in the bank at that time. Therefore, CLWA needs to increase the amount it can extract if it hopes to get back all of the water that it has placed in the bank.

Estimates of Without Project Conditions

Without the additional 7,500 AFY extraction capacity from the RRBWSD Banking Program, the SCV will be unable to access dry-year supplies as needed in the single-dry year and multiple-dry year scenarios in the 2010 UWMP. Additionally, current operating plans for 2015 and 2016 require additional extraction capacity from both the RRBWSD/CLWA Banking Program 2014 Drought Relief Project and the Semitropic Water Storage District (SWSD) Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA Project (CLWA-2) to meet local water demand if the drought persists into those years.

Without the Project, CLWA can obtain a maximum of approximately 5,000 AF each year from the RRBWSD Banking Program. If CLWA only obtained water in dry years, by 2035, CLWA would have extracted 45,000 AF, meaning that CLWA could potentially forfeit almost 60,000 AF of water CLWA placed into the RRBWSD Banking Program.

CLWA has no alternative dry-year water supply that is both reliable and cost effective to replace banked supplies. Obtaining additional water from the SWP during drought years is improbable and local groundwater pumping is already planned to increase during dry years (Kennedy/Jenks Consultants, 2011, pg. 6-2). One potential alternative is for CLWA to bank water through a different groundwater banking program and then get this water back in dry years; another alternative is for CLWA to produce recycled water. The costs for these alternatives are presented in the cost effectiveness analysis section of this attachment.

Descriptions of Methods Used to Estimate Physical Benefits

With the Project, the three additional wells and transmission capacity to be constructed will extract 9,000 AFY (RRBWSD, 2014a, pg. 10); however, in order to account for maintenance and repair time, the capacity of the wells and transmission is conservatively estimated to be 7,500 AFY.

The number of years in which CLWA will request extraction of its banked water from the RRBWSD Banking Program is assumed to be four out of every ten years. This assumption is based on the need for extraction from the Semitropic Water Bank over the last ten years, and in consideration of the 81-year hydrology for deliveries of the SWP (typically in years with an SWP delivery of greater than 40% CLWA could be expected to recharge its banking programs, and in years with a low delivery, less than 35%, would recover water from the banking programs. CLWA extracted 4,950 AF total in 2009 and 2010 (Luhdorff and Scalmanini, 2014) and will do so again in 2014 and 2015 (4,950 AF total) by using Newhall Lands first priority extraction. However utilization of

Alternative 1

One alternative to the RRBWSD/CLWA Banking Program 2014 Drought Relief Project might be for CLWA to pursue contracting with a different groundwater bank to obtain water during drought years. This is problematic for several reasons. First, utilizing another water bank does not make use of water that CLWA has already stored in the RRBWSD Banking Program and needs to extract before the expiration date of the program or risk losing the water. Without the Project, CLWA can obtain 5,000 AF each year from the RRBWSD Banking Program. If CLWA only obtained water in dry years, by 2035, CLWA would have extracted 45,000 AF, meaning that CLWA would potentially forfeit almost 60,000 AF of water CLWA placed into the RRBWSD Banking Program. With the Project, CLWA can retrieve by 2035 all of the water it placed into the RRBWSD Banking Program before 2014.

Second, the RRBWSD Banking Program has lower costs for moving water into and out of its bank than other banks in the region. For example, the Antelope Valley Water Bank, administered by the Semitropic-Rosamond Water Bank Authority, sells shares for $2,078 (Rozman et al., 2011, pg. 21). A single share gives the owner 1 AFY of extraction, 1 AFY of recovery, and 5 AF of storage. In order to match the extraction and recovery of CLWA's proposed Project through the RRBWSD Banking Program, CLWA would have to purchase 7,500 shares. As is shown in Table 3-5, the total cost to purchase these 7,500 shares is $15.6 million; in present value, the cost is approximately $14.7 million. The $2,078 per share figure does not include management or maintenance fees, or the cost to extract or recharge water. If included, the combined management and maintenance fee is $24.52 per share, while the cost to extract or recharge an AF of water is approximately $80, without including the energy costs which CLWA would have to pay (Boschman, 2011, pg. 70).

Moreover, the other potential groundwater banks, such as the Antelope Valley Water Bank, are located near the East Branch of the California Aqueduct, downstream of CLWA's position. Because of this, if CLWA used these alternative groundwater banks, CLWA would need to contract with a third party in order to be able to obtain an equivalent amount of banked water via exchange, adding more cost and feasibility considerations to the alternative.

Without considering any groundwater banking or contractual fees, purchasing the necessary shares in another groundwater bank, at a present value of $14.7 million, would cost more than the cost of the proposed Project. Also note that the $14.7 million cost does not include the cost of purchasing the water to be placed into the bank. The reason that this cost is not included is that a large portion of the water placed into the bank would likely be SWP water obtained by CLWA in wet years. As CLWA is obligated to pay for all of its SWP Table A amount, regardless of how much CLWA receives of it, this cost should not be assigned to this Project alternative, though contingency on the alternative bank's location, there could be additional transportation costs.

SWSD Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA

The following (quantifiable) physical benefits are expected from this Project:

1. Provide CLWA with access to an additional 5,000 AF of drought year banked water supply
2. Recharge SWSD's groundwater aquifer by 5,000 AF during wet years

In addition to the physically quantified benefits expected from this Project, the following non-quantifiable benefits are important to understanding the full value of the Project: the conjunctive use of SWSD's groundwater aquifer will recharge the basin during wet years, while during dry years the Project provides a cooperative way to allocate water among several water agencies. In particular, the recharge of the basin will raise groundwater levels, which will provide benefits to farmers in the area including reduced pumping costs and enhanced water supply availability. The Project also provides environmental benefits to the Kern County National Wildlife Refuge, part of which is located in SWSD's service area, and other native undeveloped land.

Each Project physical benefit is discussed individually below, with an overview of each benefit expected over the Project life, followed by a technical analysis of the physical benefit claimed.

A cost effectiveness analysis is provided for the Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2) following the Project benefits and technical analysis discussion.

Project Physical Benefits

Benefit 1: Provide access to an additional 5,000 AF of drought year banked water supply

As shown in Table 3-7, with the Project, CLWA will have access to an additional 5,000 AFY during dry years with the Project to meet its water demands.

Table 3-7 – Annual Project Physical Benefits

Project Name: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)

Type of Benefit Claimed: Provide an additional 5,000 AF of drought year supply

Units of the Benefit Claimed: Acre-feet

Additional Information About this Benefit: CLWA will obtain water from SWSD during dry years (which are predicted to occur in four years out of every ten)

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	5,000	5,000
2016	0	5,000	5,000
2017	0	0	0
2018	0	0	0
2019	0	0	0
2020	0	5,000	5,000
2021	0	5,000	5,000
2022	0	0	0

Table 3-7 – Annual Project Physical Benefits

Project Name: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)

Type of Benefit Claimed: Provide an additional 5,000 AF of drought year supply

Units of the Benefit Claimed: Acre-feet

Additional Information About this Benefit: CLWA will obtain water from SWSD during dry years (which are predicted to occur in four years out of every ten)

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2023	0	0	0
2024	0	0	0
2025	0	5,000	5,000
2026	0	5,000	5,000
2027	0	0	0
2028	0	0	0
2029	0	0	0
2030	0	5,000	5,000
2031	0	5,000	5,000
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	0	0	0

Comments: Without the Project, CLWA cannot take water from SWSD in dry years using its own second priority shares as the entire extraction capacity of the Semitropic Groundwater Storage Bank is taken by water agencies with first priority shares. By 2024, CLWA will forfeit the approximately 36,000 AF that it will have remaining in the Semitropic Groundwater Storage Bank unless its agreement for the existing program is extended.

With the Project, CLWA can obtain 5,000 AF each year from the SWRU. If CLWA only obtained water in dry years, by 2035, CLWA would have extracted 40,000 AF, meaning that CLWA would not forfeit any of the water placed into the bank prior to 2014. By acquiring shares in the SWRU, CLWA will have rights to move the water to a first priority program and recovery water through 2035. (CLWA may also place more water into SWRU during wet years after 2014, increasing the total amount in the bank above 36,000 AF.)

Technical Analysis of Physical Benefits Claimed

Benefit 1: Provide access to an additional 5,000 AF of drought year banked water supply

The SWSD Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA Project will provide CLWA with 5,000 AFY of first priority extraction capacity in SWSD's new groundwater banking program, the Semitropic Water Recovery Unit (SWRU). CLWA plans to use the priority extraction rights to help meet its water demand during drought years, like the current one. Based on the historical 81-year hydrology provided by the SWP, it is assumed that CLWA will call upon its banked supplies for extraction of water in four out of every ten years.

Technical Basis of the Project

The Semitropic Groundwater Storage Bank is SWSD's original groundwater bank, which began operations in 1994. At the end of 2014, CLWA expects to have 35,970 AF banked in the SWSD Groundwater Storage Bank, which is difficult to extract during dry years (Luhdorff and Scalmanini, 2014, Table 4-1). CLWA is a second priority partner in the banking program meaning that it cannot extract water but must use a first priority partner's extraction capacity. In order to utilize the SWSD Groundwater Storage Bank, CLWA is expected to use the Newhall Land's first priority extraction capacity of 4,950 AF as documented in the 2010 Santa Clarita Valley Urban Water Management Plan (Kennedy/Jenks Consultants et al. 2011, p. 3-2, 3-41). This has proven problematic in that costs of the use of this extraction capacity are high, CLWA is expected to provide additional water to the first priority partner, the time to negotiate agreements is lengthy and delays delivery of the water and the availability is not guaranteed in a given year when the banked supplies are needed in the CLWA service area. In order to ensure that the CLWA service area has access to banked supplies during critical dry years, like the current one, it is imperative that CLWA acquire first priority access to its banked supplies. Therefore, CLWA will obtain 5,000 AF of first priority extraction capacity in the SWRU, allowing the Agency to more readily recover the banked water it has already placed in the Semitropic Groundwater Storage Bank. CLWA will purchase 5,000 shares in SWRU, which provides the 5,000 AFY of extraction, 5,000 AFY of recharge capacity as well as 15,000 AF of storage capacity.

Recent and Historical Conditions

CLWA has two groundwater banking agreements with the SWSD in Kern County where in 2002 and 2003, CLWA banked more than 50,000 AF into the Semitropic Groundwater Storage Bank (Kennedy/Jenks Consultants et al., 2011, pg. 3-40). In accordance with those amended agreements, over a twenty-year period (until 2022/2024), CLWA could withdraw this stored water to meet future Valley demands when needed. At the end of 2014, CLWA will have rights to 35,970 AF in the Semitropic Groundwater Storage Bank, after recovering 4,950 AF in 2009/2010 (Luhdorff and Scalmanini, 2014, pg. 74) and recovering another 4,950 AF in 2014 along with a payment of an additional 5,000 AF (in addition to monetary cost) to Newhall Land for the use of its first priority recovery capacity. The 2010 UWMP states that CLWA plans to obtain 11,500 AFY of banked water from SWSD under the multiple-dry years scenario and 15,000 AFY under the single-dry year scenario through 2023 (Kennedy/Jenks Consultants et al., 2011, pg. 6-5).

However, CLWA is unable to obtain these amounts banked water in dry years from the Semitropic Groundwater Storage Bank, because CLWA has only second priority shares in the bank. Instead, in most dry years, the extraction capacity of the Semitropic Groundwater Storage Bank is completely used by entities with first priority extraction capacity in the bank, either for their own use or to sell to third parties.

Estimates of Without Project Conditions

Without the Project, CLWA cannot take water from SWSD in dry years using its own second priority shares as the entire extraction capacity of the Semitropic Groundwater Storage Bank is used by water agencies with first priority shares. Thus, CLWA will need to obtain 5,000 AF of drought year supply from another source. Additionally, current operating plans for 2015 and 2016 require additional supplies from both this Project, and the RRBWSD/CLWA Banking Program (CLWA-1) if the drought persists into those years. However, CLWA has no alternative water supply that is both reliable and cost effective to replace banked supplies. Obtaining additional water from the SWP during drought years is improbable and groundwater pumping is already planned to increase during dry years (Kennedy/Jenks Consultants et al., 2011, pg. 6-2).

Descriptions of Methods Used to Estimate Physical Benefits

CLWA wishes to purchase 5,000 first priority shares in SWRU. One share allows 1 AF per year of recovery, 3 AF of storage, and 1 AF per year of recharge capacity (Semitropic Water Storage District, 2014a, pg. 2). Thus, CLWA will have first priority extraction rights to 5,000 AF per year of recovery, and 15,000 AF of storage.

The number of years in which CLWA will request extraction of its banked water from SWSD Banking Program is assumed to be four out of every ten years. This assumption is based on CLWA's need for extraction from the Semitropic Groundwater Storage Bank over the last ten years, and in consideration of the 81-year hydrology for deliveries of the SWP (typically in years with an SWP delivery of greater than 40% CLWA could be expected to recharge is banking programs (provided there is capacity in those programs), and in years with a low delivery, less than 35% would likely recover water from the banking program (DWR, 2013, pg. 106, 107). CLWA extracted 4,950 AF total in 2009 and 2010 (Luhdorff and Scalmanini, 2014) and will do so again in 2014 and 2015 (4,950 AF total) by using Newhall Lands first priority extraction. However utilization of these supplies requires large expenditures, which would create a financial burden on CLWA, in addition to being time consuming and unreliable. The analysis runs through 2035, the year that CLWA's new agreement for the SWRU with SWSD will expire.

Identification of All New Facilities, Policies, and Actions Required to Obtain the Physical Benefits

No new facilities, policies or actions are required to obtain the physical benefits of the Project, other than those facilities that will be constructed as part of the Project. Water would be delivered by the Pond Poso Canal to the SWP Aqueduct and then to Castaic Lake. CLWA will purchase shares from SWSD, who will construct the needed conveyance, recharge, extraction, and return facilities in SWRU so that CLWA has extraction capacity of 5,000 AFY. Specifically, SWSD will equip and plumb wells, install pump and motor units and variable frequency drives, and construct a substation and electrical distribution line. The facilities will allow CLWA to obtain 5,000 AF in as few as 25 days from requesting the extraction if needed.

Description of Any Potential Adverse Physical Effects

No potential adverse physical effects are anticipated from this Project. In 2010, when CLWA wished to extend the year by which CLWA would be required to remove all of its water from the Semitropic Groundwater Storage Bank, the CEQA Initial Study/Negative Declaration found "no substantial evidence that the Project may have a significant effect on the environment" (Kennedy/Jenks Consultants, 2010, pg. 10). CLWA will write an addendum to the 2010 CEQA Initial Study/Negative Declaration to confirm that the changes to the banking program will not result in any significant environmental effects.

Project Physical Benefits

Benefit 2: Recharge SWSD's Groundwater Banking Program's groundwater aquifer by 5,000 AF during wet years

As shown in Table 3-8, with the Project, CLWA will be able to place an additional 5,000 AF during wet years into SWRU in order to later recover the water during future dry years. (Only 90% of the water that CLWA banks, or 4,500 AF in years when CLWA banks the maximum, is recoverable.) Without the Project, CLWA may not be able to most effectively use its water supply during wet years when CLWA's water supply exceeds demands. The program would also permit CLWA to move its second tier banked supplies (up to the 15,000 AF of capacity) into the SWRU allowing for prompt access to that banked water during drought years.

Table 3-8 – Annual Project Physical Benefits			
Project Name: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2) **Type of Benefit Claimed:** Recharge SWSD's aquifer by 5,000 AF during wet years **Units of the Benefit Claimed:** Acre-feet **Additional Information About this Benefit:** CLWA will place water into the SWRU during wet years (which are predicted to occur in one year out of every ten)			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	0	5,000	5,000
2019	0	0	0
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	0	0	0
2024	0	0	0
2025	0	0	0
2026	0	0	0
2027	0	0	0
2028	0	5,000	5,000
2029	0	0	0
2030	0	0	0
2031	0	0	0
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	0	0	0
Comments: CLWA will place 5,000 AF into the SWSD's aquifer in 2018 and 2028; only 90% of this water, or 4,500 AF, is ultimately recoverable.			

Technical Analysis of Physical Benefits Claimed

Benefit 2: Recharge SWSD's Groundwater Banking Program's groundwater aquifer by 5,000 AF during wet years

The Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA Project will allow CLWA to store 15,000 AF in SWRU, with an annual maximum recharge amount of 5,000 AF (Semitropic Water Storage District, 2014a, pg. 2). CLWA plans to place water into the aquifer during wet years when CLWA has a greater water supply than demand. Based on the historical 81-year hydrology provided by the SWP and historical demands, for this analysis, it is assumed that CLWA will place water into the SWRU in one

out of every ten years. The program would also permit CLWA to move its second tier banked supplies (up to the 15,000 AF of capacity) into the SWRU allowing for prompt access to that banked water during drought years.

Technical Basis of the Project

With the purchase of 5,000 AFY of first priority extraction capacity, CLWA can put 5,000 AFY back into SWSD's aquifer through in-lieu recharge at SWRU. In-lieu recharge means that CLWA would provide to SWSD 5,000 AF, who would then distribute this water to farmers. In return, the farmers would reduce their groundwater pumping by the same amount, resulting in less water leaving the groundwater basin. For giving SWSD 5,000 AF when CLWA does not need the water, CLWA can later extract 90% of this water, or 4,500 AF, in dry years (Semitropic Water Storage District, 2014a, pg. 2) and can continue at that rate for as long as it has banked supplies remaining in the program.

Recent and Historical Conditions

In 2002 and 2004, CLWA banked more than 50,000 AF into the Semitropic Groundwater Storage Bank (Kennedy/Jenks Consultants et al., 2011, pg. 3-40). About 36,000 AF of that amount will not been extracted by the end of 2014. With this Project, CLWA can bank 5,000 AF per year in SWRU during wet hydrology, providing CLWA with a place to store water when CLWA's demand is less than its total supply.

Estimates of Without Project Conditions

Without this Project, CLWA would not bank any more water with SWSD (even in wet years). CLWA currently cannot extract in dry years the large quantity of water CLWA currently owns in the Semitropic Groundwater Storage Bank. CLWA wants to recover this water before its shares in the bank expire and have the ability to provide adequate supplies in drought years consistent with the 2010 UWMP. Therefore, without the Project, CLWA will not have flexibility to store water in years when CLWA has a greater supply than demand for its water. In these years, once CLWA has banked as much water as possible through banking arrangements, CLWA must reduce the amount of water it takes from the SWP. While reducing water taken from the SWP has benefits, these benefits are minimized during wet years when the overall supply of water throughout California is maximized and the supplies stored by CLWA in the SWP are at risk due to "spill" during these wet years. Moreover, not having adequate banking capacity could be damaging to CLWA in dry years when CLWA needs as much banked water as possible.

Descriptions of Methods Used to Estimate Physical Benefits

CLWA wishes to purchase 5,000 first priority shares in SWRU. One share allows 1 AF per year of recovery, 3 AF of storage, and 1 AF per year of recharge (Semitropic Water Storage District, 2014a, pg. 2). Thus, CLWA will have rights to store up to 5,000 AF per year of water in the bank up to a total of 15,000 AF. The program would also permit CLWA to move its second tier banked supplies (up to the 15,000 AF of capacity) into the SWRU allowing for prompt access to that banked water during drought years.

The number of years in which CLWA will place water into SWRU is assumed to be one out of every ten years. CLWA assumes that it will be able to bank water when SWP allocations are greater than 40%. According to the historical record, SWP Table A deliveries to CLWA have been greater than 40% in roughly 2 out of every 10 years, on average (DWR, 2013, pg. 102, 103). It is conservatively assumed that CLWA will bank surplus water one out of every 10 years. In these years, CLWA will bank 5,000 AF. The analysis runs through 2035, the year that CLWA's contract with SWSD concerning SWRU will expire.

Identification of All New Facilities, Policies, and Actions Required to Obtain the Physical Benefits

No new facilities, policies or actions are required to obtain the physical benefits of the Project, other than those facilities that will be constructed as part of the Project. CLWA will purchase shares from SWSD, who will construct the needed conveyance, recharge, extraction, and return facilities in SWRU so that CLWA has recharge

capacity of 5,000 AFY. Specifically, SWSD will equip and plumb wells, install pump and motor units and variable frequency drives, and construct a substation and electrical distribution line (Kennedy/Jenks Consultants et al., 2014, pg. 1).

Description of Any Potential Adverse Physical Effects

No potential adverse physical effects are anticipated from this Project. In 2010, when CLWA wished to extend the year by which CLWA had to remove the water from the Semitropic Groundwater Storage Bank, the CEQA Initial Study/Negative Declaration found "no substantial evidence that the Project may have a significant effect on the environment" (Kennedy/Jenks Consultants, 2010, pg. 10). CLWA will write an addendum to the 2010 CEQA Initial Study/Negative Declaration to confirm that the changes to the banking program will not result in any significant environmental effects.

Non-quantified Benefits

The Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA Project has important non-quantified benefits. First, the Project will increase the conjunctive use of SWSD's groundwater aquifer. During wet years, the additional water placed into the aquifer will recharge the basin. The recharging of the basin will raise groundwater levels, which will reduce groundwater pumping costs to farmers in the area. During dry years, the Project provides a cooperative way to allocate scarce water among several water agencies, including CLWA. The cooperation of the water agencies during dry years will reduce the chances of water agencies not being able to meet the water demands of their customers.

Second, the Project provides environmental benefits to the Kern County National Wildlife Refuge, part of which is located in SWSD's service area, and other native undeveloped land that SWRU is located on (Semitropic Water Storage District, 2014b, pg. 1). In particular, as part of SWRU's development, SWSD proposed a Habitat Conservation Plan to protect into perpetuity much of the land on which SWRU is located, and mitigate for any disturbance created by the Project (Semitropic Water Storage District, 2014c, pg. 1). The bank is located on the Pacific Flyway and provides important wintering habitat for migratory waterfowl (U.S. Fish and Wildlife Service, 2005, pg. 3). Through the purchase of shares in the bank, CLWA contributes towards SWSD's environmental efforts.

Cost Effectiveness Analysis

The cost effectiveness analysis for the Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA is summarized in Table 3-9 below, with a more complete narrative description for each option provided below.

Table 3-9 – Cost Effective Analysis

Project name: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)

Question 1	*Types of benefits provided as shown in Table 5.* 1) Provide CLWA an additional 5,000 AF of drought year supply; 2) Recharge SWSD's aquifer by 5,000 AF during wet years
Question 2	*Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?* Yes.
	If no, why? N/A

Table 3-9 – Cost Effective Analysis **Project name:** Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)	
	If yes, list the methods (including the proposed project) and estimated costs. CLWA proposes to purchase first priority extraction capacity in the SWRU that will allow CLWA to extract water that CLWA already has banked with SWSD. The present value capital and operations and maintenance costs total approximately $10.8 million. Alternative projects include: **Alternative 1** – purchasing use of Newhall Land's first priority extraction priority that has a present value cost of $16.3 million, **Alternative 2** – receiving banked water from another water bank that has a present value cost of $9.8 million, which is likely underestimated in that it does not account cost for 3rd party assistance physically supplying the water to CLWA by exchange, and, **Alternative 3** – producing recycled water that has a present value cost of $40.0 million. None of these project alternatives would make use of water that CLWA has already stored at the Semitropic Groundwater Storage Bank, which CLWA would forfeit if it cannot extract.
Question 3	*If the proposed project is not the least cost alternative, why is it the preferred alternative?* The cost for alternative 2, receiving banked water from another water bank, is likely underestimated in that it does not include the cost for 3rd party assistance in enabling CLWA to physically receive stored water that is on the other side of the valley. Most importantly, using an alternative water bank and not purchasing first priority shares at SWRU would result in CLWA potentially forfeiting all 36,000 AF that CLWA will have banked at the Semitropic Groundwater Storage Bank. The program would permit CLWA to move it second tier banked supplies (up to the 15,000 AF of capacity) into the SWRU allowing for prompt access to that banked water during drought years.

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed Project. The project alternatives considered are (1) purchasing Newhall Land's first priority extraction priority, (2) receiving banked water from another water bank, and (3) producing recycled water.

The capital cost for the proposed Project, which consists of purchasing first priority extraction capacity in SWRU, is $8.45 million, or $8.0 million in present value 2014 dollars. In addition, CLWA must pay an annual cost of $70,850 in management and maintenance fees (Semitropic Water Storage District, 2014a, 3). CLWA must also pay $123.32 per AF plus energy costs when stored water is extracted, which is expected to be 20,000 AF over the 2015 to 2024 period (Semitropic Water Storage District, 2014a, 3). Excluding energy costs, all other annual costs are approximately $4.0 million, or $2.8 million in present value.

Therefore, as is shown in Table 3-10, the total capital and operations and maintenance cost over the course of the project's life is approximately $12.4 million; in present value, the total costs are approximately $10.8 million.

Alternative 1

Without the Project, in each dry year CLWA would investigate purchasing the use of Newhall Land's first priority extraction capacity of 4,950 AFY in the Semitropic Groundwater Storage Bank. In order to obtain dry-year supplies in 2014, CLWA bought one year's rights to Newhall Land's first priority extraction capacity for $1.3 million and was required to give Newhall Land 5,000 AF of CLWA's water stored in the Semitropic Groundwater Storage Bank. While CLWA has to give up money and water to Newhall Land, the deal is attractive because it allows CLWA to recover the water it has placed in the Semitropic Groundwater Storage Bank. However, there is no guarantee that Newhall Land would be willing to make this deal with CLWA in future dry years, and there is no guarantee that Newhall would offer the same terms for the deal. Additionally, the negotiation and execution of any agreement to use Newhall Land's extraction capacity is time consuming and the ability to deliver drought-year supplies is often delayed.

Assuming that Newhall Land gives CLWA the same selling terms, CLWA has enough water stored in the Semitropic Groundwater Storage Bank to purchase the use of Newhall Land's first priority extraction capacity four times, except that in the fourth dry year, CLWA will not be able to make a full purchase. Because CLWA gives up a total of 9,950 AF of banked Semitropic water in this deal (5,000 AFY to Newhall, plus extraction of 4,950 AFY), CLWA will only have 6,120 AF remaining in the Semitropic Groundwater Storage Bank after the first three purchases. In the fourth dry year, it is assumed that CLWA will exhaust all of the remaining banked water, purchasing 3,060 AF of first priority extraction capacity in exchange for giving Newhall Land $0.8 million and 3,060 AF.

Assuming an AF of CLWA's stored water is worth roughly $850, which is CLWA's marginal water supply cost for attaining additional SWP water when it is available, the water given to Newhall Land in the deal is assumed to be worth $15.4 million. Including the fee paid to Newhall, the total cost to obtain Newhall Land's first priority extraction capacity is $20.0 million or approximately $16.3 million in present value, as shown in Table 3-11.

This alternative is not feasible for CLWA, from several perspectives. First, compared to the proposed Project, CLWA loses 18,060 AF from its SWSD storage over the first four dry years and gets no water in future dry years (because it has run out of banked water). Therefore, this option does not provide dry year supply for the same amount of years into the future as the proposed Project. The Newhall Land alternative would provide dry year supply until 2021, whereas the proposed Project would provide dry year supply through the year 2035. Additionally, as a public agency, CLWA must undertake significant internal review before each agreement with Newhall Land can be completed. CLWA is concerned that this process could be sufficiently lengthy in the future that CLWA will not be able to obtain the first priority extraction rights from Newhall Land when CLWA most needs water.

Table 3-11 – Annual Costs of Project Alternative 1
(All costs should be in 2014 Dollars)
Project: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)
Alternative (1): Purchasing Newhall Land's first priority extraction priority

	Initial Costs Grand Total Cost from Table 7 (row (l), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor[3]	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2014	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2015	$ -	$ -	$ -	$5,550,000.00	$ -	$ -	$ -	$5,550,000.00	0.943	$5,233,650
2016	$ -	$ -	$ -	$5,550,000.00	$ -	$ -	$ -	$5,550,000.00	0.890	$4,939,500
2017	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.840	$ -
2018	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.792	$ -
2019	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.747	$ -
2020	$ -	$ -	$ -	$5,550,000.00	$ -	$ -	$ -	$5,550,000.00	0.705	$3,912,750
2021	$ -	$ -	$ -	$3,396,600.00	$ -	$ -	$ -	$3,396,600.00	0.665	$2,258,739
2022	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.627	$ -
2023	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.592	$ -
2024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.558	$ -
2025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.527	$ -
2026	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.497	$ -
2027	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.469	$ -
2028	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.442	$ -
2029	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.417	$ -
2030	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.394	$ -
2031	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.371	$ -
2032	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.350	$ -
2033	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.331	$ -
2034	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.312	$ -
2035	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.294	$ -
									Total Present Value of Discounted Costs (Sum of column (j))	**$16,344,639**

Comments: In this alternative, CLWA purchases first priority extraction capacity from Newhall Land four times between 2015-2024. The first three times Newhall Land charges CLWA a $1.3 million fee and 5,000 AF per time. As CLWA does not have sufficient banked water, the fourth time, Newhall Land charges a $0.8 million fee and 3,060 AF. Each AF is valued at $850.

Alternative 2

Another alternative that CLWA could pursue without the Project is using another groundwater bank from which to obtain water during drought years. For this alternative, CLWA would have to buy shares in another water banking program, like the Antelope Valley Water Bank. Shares in the Antelope Valley Water Bank, which is administered by the Semitropic-Rosamond Water Bank Authority, cost $2,078 (Rozman et al., 2011, pg. 21). A single share gives the owner 1 AFY in extraction, 1 AFY in recovery, and 5 AF in storage. In order to match the extraction and recovery of CLWA's proposed Project through SWRU, CLWA would have to purchase 5,000 shares. The total cost to purchase these 5,000 shares is $10.39 million; in present value, the cost is approximately $9.8 million. These costs are shown in Table 3-12. (The $2,078 per share figure does not include management or maintenance fees, or the cost to extract or recharge water. The combined management and maintenance fee is $24.52 per share, while the cost to extract or recharge an AF of water is approximately $80, without including the energy costs which CLWA would have to pay (Boschman, 2011, pg. 70).)

Moreover, the other potential groundwater banks, including the Antelope Valley Water Bank, are located near the East Branch of the California Aqueduct, downstream of CLWA's SWP delivery location at Castaic Lake. Because of this, if CLWA used these alternative groundwater banks, CLWA would need to contract with a third party in order to be able to obtain an equivalent amount of banked water via exchange. If it proves feasible to agree with a third party on a deal, this could add significant cost to this option and potential delay in delivery of banked supplies. This cost could not be quantified for this analysis because possible terms for a deal with a third party are not known. Additionally, the SWP transportation costs would likely increase.

The monetizable cost for this Project alternative totals $9.8 million in present value 2014 dollars, and appears to cost about $1 million less than the proposed Project. However, costs for this option do not include any groundwater banking or contractual fees, or the cost of contracting with third-parties to gain physical access to the water stored through exchange. Once all of these costs are added into the alternate water banking option, the Semitropic option will likely become the least-cost option in this analysis.

In addition, utilizing an alternate water bank and not obtaining first priority shares in SWSD's SWRU would likely mean that CLWA would have to forfeit, or pay the high costs of using Newhall Land's extraction capacity to recover all of the water it has placed into the Semitropic Groundwater Storage Bank in addition to this alternative's cost. This fact severely reduces the feasibility of this alternate banking project option for CLWA.

Table 3-12 – Annual Costs of Project Alternative 2
(All costs should be in 2014 Dollars)
Project: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)
Alternative (2): Receiving Banked Water from Another Water Bank

	Initial Costs Grand Total Cost from Table 7 (row (l), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor[3]	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2014	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2015	$10,390,000	$ -	$ -	$ -	$ -	$ -	$ -	$10,390,000	0.943	$9,797,770
2016	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.890	$ -
2017	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.840	$ -
2018	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.792	$ -
2019	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.747	$ -
2020	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.705	$ -
2021	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.665	$ -
2022	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.627	$ -
2023	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.592	$ -
2024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.558	$ -
2025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.527	$ -
2026	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.497	$ -
2027	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.469	$ -
2028	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.442	$ -
2029	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.417	$ -
2030	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.394	$ -
2031	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.371	$ -
2032	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.350	$ -
2033	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.331	$ -
2034	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.312	$ -
2035	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.294	$ -
								Total Present Value of Discounted Costs (Sum of column (j))		**$9,797,770**

Comments: Assumes shares in the water bank chosen cost $2,078/AF.

Alternative 3

A third potential project alternative is the production of recycled water. With this alternative, the recycled water is assumed to be produced only in the same years as the water banking alternative would be withdrawing water. CLWA estimated the capital cost to produce 12,364 AFY at $102.1 million (Lee and Ro, 2013, pg.12). Scaling this to the 5,000 AFY that would be obtained from the bank during dry years from the proposed Project, the capital cost of recycled water production is approximately $41.3 million or $38.9 million in present value. Based on transmitting and distributing recycled water at CLWA's Valencia and Saugus Water Reclamation Plants, O&M costs are assumed to be 0.5% of the capital costs, or $206,446 per year. The production of 40,000 AF, as would be obtained if CLWA proceeded with the CLWA Semitropic Water Banking Extraction Enhancement Project, would cost $1.7 million; in present value, the cost is approximately $1.0 million. Therefore, as is shown in Table 3-13, producing recycled water would cost $42.9 million total; in present value, the total costs are approximately $40.0 million.

As with the other two project alternatives, utilizing an expanded water recycling alternative and not obtaining first priority shares in SWSD's SWRU would mean that CLWA may have to forfeit, or pay the high costs of using Newhall Land's extraction capacity to recover all of the water it has placed into the Semitropic Groundwater Storage Bank in addition to this alternative's cost. This fact severely reduces the feasibility of this alternate as a project option for CLWA.

Table 3-13 – Annual Costs of Project Alternative 3
(All costs should be in 2014 Dollars)
Project: Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA (CLWA-2)
Alternative (3) Producing Recycled Water

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor[3]	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2014	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2015	$41,289,227	$ -	$ -	$206,446	$ -	$ -	$ -	$41,495,673	0.943	$39,130,420
2016	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.890	$183,737
2017	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.840	$ -
2018	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.792	$ -
2019	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.747	$ -
2020	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.705	$145,545
2021	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.665	$137,287
2022	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.627	$ -
2023	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.592	$ -
2024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.558	$ -
2025	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.527	$108,797
2026	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.497	$102,604
2027	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.469	$ -
2028	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.442	$ -
2029	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.417	$ -
2030	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.394	$81,340
2031	$ -	$ -	$ -	$206,446	$ -	$ -	$ -	$206,446	0.371	$76,592
2032	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.350	$ -
2033	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.331	$ -
2034	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.312	$ -
2035	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.294	$ -
									Total Present Value of Discounted Costs (Sum of column (j))	$39,966,320

Summary of Annual Project Physical Benefits and Cost Effectiveness Analysis

The physical benefits claimed for this Project include providing CLWA an additional 5,000 AF of drought year supply and recharging SWSD's aquifer by 5,000 AF during wet years. In addition, the Project increases the conjunctive use of SWSD's aquifer basin provides environmental benefits to the Kern County National Wildlife Refuge and other native undeveloped land. The project alternatives presented in the cost-effectiveness analysis included purchasing Newhall Land's first priority extraction priority, receiving banked water from another water bank, and producing recycled water. While the alternative of receiving banked water from another water bank appears to cost less than the proposed Project, significant costs for third party assistance with physically obtaining water through that option have not been estimated, and would likely show that the SWRU option is the least cost option. Additionally, each of project alternatives presented except the proposed Project would result in CLWA potentially forfeiting all of the water it has banked in the Semitropic Groundwater Storage Bank, which is not a feasible outcome for CLWA.

References

Boschman, Will. 2011. Groundwater Storage Project. April 13.

California Department of Water Resources (DWR). 2013. Draft Technical Addendum to the State Water Project Delivery Reliability Report 2013. State of California, Natural Resources Agency, Department of Water Resources. September.

Kennedy/Jenks Consultants et al. 2011. 2010 Santa Clarita Valley Urban Water Management Plan. Prepared for Castaic Lake Water, CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company. June.

Kennedy/Jenks Consultants. 2010. CEQA Initial Study/Negative Declaration: Castaic Lake Water Agency's 2002 and 2003 Groundwater Banking Projects. November.

Lee and Ro, Inc., 2013. Castaic Lake Water Agency, Recycled Water Optimization Evaluation. October 2013.

Luhdorff and Scalmanini. 2014. 2013 Santa Clarita Valley Water Report. June 2014.

Rozman, Marc, Lorena Ospina, and Susan Ngo. 2011. Semitropic-Rosamond Water Bank Authority Antelope Valley Water Bank. January 25.

Semitropic Water Storage District. 2014a. Rate Structure for Customers. January.

Semitropic Water Storage District. 2014b. Wildlife Improvement District.

Semitropic Water Storage District. 2014c. Habitat Conservation Plan.

U.S. Fish and Wildlife Service. 2005. Kern and Pixley National Wildlife Refuges: Final Comprehensive Conservation Plan. February.

Reference Documentation for the Semitropic Extraction and Conveyance Improvements for Return of Stored (Banked) Water to CLWA is provided in Att3_DG_ProJust_3of4.

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

2015 RATE SHEET

Prepared: 2/27/2015

		Billing Rate	
District Owned Equipment, $/Day			
	Drilling Rig	$ 1,028.85	
	Back hoe	25.31	
	Air-compressor	26.66	
	Tractor - Kenworth	31.66	
	Tractor - Other	31.36	
	Well Pulling Unit	276.95	
	Service Truck and Trailer	15.93	
	Well Developing Equipment	233.17	
	1-Ton Truck	13.92	
	1/2 - Ton Truck	11.17	
	3800 Gallon Water Tank	10.45	
	Well Log Camera	400.00	Per Well incl. Labor
District Labor, $/Hr			
	Engineer - Supervisor	$ 126.66	
	Drilling Consultant	93.29	
	Driller 1	56.17	
	Driller 2	60.57	
	Developer	60.87	
	Drilling Helper	41.81	
	Welder	41.81	
	General Maintenance	41.81	

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 $0.575 per mile

Semitropic Water Storage District
Equipment Procurement Costs, Phase 2 & 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										Collection Pipeline	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	Collection Pipeline	
Well #1	$15,726.13	$26,047.00						560	LF	$35.74	$20,014.40	560	LF	$33.70	$18,872.00	1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	20	LF	$15.38	$307.60	$154.53	$148.36	$76.16	$212.40	$217.60	$242.44	$18.36	$26.00	$25.01	$1,397.07	$2,500.00	$ 88,920.86
Well #2	$15,726.13	$26,047.00						560	LF	$35.74	$20,014.40	560	LF	$33.70	$18,872.00	1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	60	LF	$15.38	$922.80	$154.53	$148.36	$76.16	$212.40	$217.60	$484.88	$18.36	$26.00	$25.01	$1,397.07		$ 87,278.50
Well #3	$15,726.13	$26,047.00						560	LF	$35.74	$20,014.40	560	LF	$33.70	$18,872.00	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		$ 86,970.90
Well #4	$17,229.00	$19,408.00	400	LF	$22.66	$9,064.00	$309.06	500	LF	$25.26	$12,630.00	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		$76,540.83
Well #5	$17,229.00	$19,408.00	400	LF	$22.66	$9,064.00	$309.06	500	LF	$25.26	$12,630.00	500	LF	$24.94	$12,470.00	1,000.00	20	LF	$35.26	$705.20	$350.00	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		$76,694.63
Well #6	$17,229.00	$19,408.00	400	LF	$22.66	$9,064.00	$309.06	500	LF	$25.26	$12,630.00	500	LF	$24.94	$12,470.00	1,000.00	20	LF	$35.26	$705.20	$350.00	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		$76,694.63
Well #7	$17,229.00	$19,408.00	400	LF	$22.66	$9,064.00	$309.06	500	LF	$25.26	$12,630.00	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	$242.44	$18.36	$26.00	$25.01	$1,397.07	$2,500.00	$78,490.79
Well #8	$17,229.00	$19,408.00	400	LF	$22.66	$9,064.00	$309.06	500	LF	$25.26	$12,630.00	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	$242.44	$18.36	$26.00	$25.01	$1,397.07	$2,500.00	$78,490.79
Well #9	$20,183.00	$20,183.00						300	LF	$35.74	$10,722.00	300	LF	$24.94	$7,482.00	1,000.00	20	LF	$76.79	$1,535.80	$ 400.00	20	LF	$15.38	$307.60	$154.53	$148.36	$76.16	$212.40	$217.60	$242.44	$18.36	$26.00	$25.01	$1,397.07	$2,500.00	$ 66,831.33
																									$716,913.28											

Note: Costs are based on estimates received from vendors (May 2015). Estimates are available upon request.

Electrical Hookup Well Costs

Well Name	Starter	Transformers, Bank Supplies CT's etc.	BackBoard	Misc.	Grand Total-Phase 4
Well #1	$6,784.30	$6,000.00	1,000.00	$7,000.00	**$20,784.30**
Well #2	$6,784.30	$6,000.00	1,000.00	$7,000.00	**$20,784.30**
Well #3	$6,784.30	$6,000.00	1,000.00	$7,000.00	**$20,784.30**
Well #4	$2,606.88	$6,000.00	1,000.00	$7,000.00	**$16,606.88**
Well #5	$2,606.88	$6,000.00	1,000.00	$7,000.00	**$16,606.88**
Well #6	$2,606.88	$6,000.00	1,000.00	$7,000.00	**$16,606.88**
Well #7	$2,606.88	$6,000.00	1,000.00	$7,000.00	**$16,606.88**
Well #8	$2,606.88	$6,000.00	1,000.00	$7,000.00	**$16,606.88**
Well #9	$8,731.68	$6,000.00	1,000.00	$7,000.00	**$22,731.68**
					$168,118.98

Note: Costs are based on estimates received from vendors (May 2015).
Estimates are available upon request.

Appendix D - Letters of Project Support

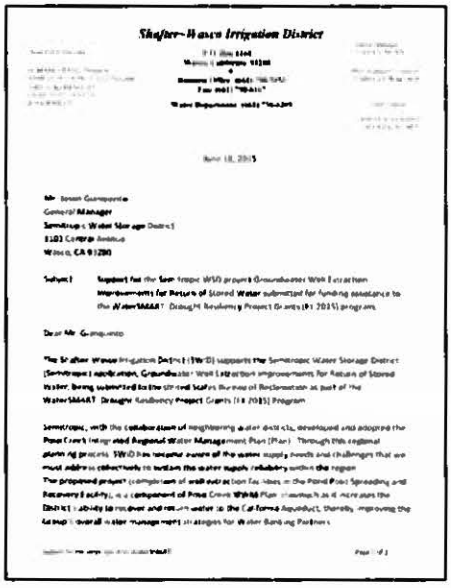
The District has received letters of support from the North Kern Water Storage District, Shafter-Wasco Irrigation District (a CVP-Friant contractor), and the Kern-Tulare Water District. Thumbnails of these letters are shown below for illustrative purposes. Full copies of each letter are available upon request.


NORTH KERN WATER STORAGE DISTRICT

North Kern Water Storage District


KERN-TULARE Water District

Kern-Tulare Water District


Shafter-Wasco Irrigation District

Shafter-Wasco Irrigation District

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