DRAFT ENVIRONMENTAL IMPACT REPORT
FOR THE
BUENA VISTA WATER STORAGE DISTRICT
BUENA VISTA WATER MANAGEMENT PROGRAM

Submitted pursuant to the requirements of the
California Environmental Quality Act

by the

BUENA VISTA WATER STORAGE DISTRICT

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OCTOBER 2009

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List of Abbreviations

AB 32	California Assembly Bill 32
AF	Acre-Feet
AF/yr	Acre-Feet per Year
ATP	Archaeological Testing Plan
BGRP	Brackish Groundwater Remediation Project
BMP	Best Management Practice
BVWSD	Buena Vista Water Storage District
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEWAMP	Conservation Easement Water Acquisition and Management Project
CNDDB	California Natural Diversity Database
CO_2Eq	Carbon Dioxide Equivalent
CRS	Cultural Resources Specialist
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
GHG	Greenhouse Gas(es)
g/mmBtu	grams per one million British thermal units
gpm	gallons per minute
GRRP	Groundwater Recharge and Recovery Project
HECA	Hydrogen Energy California
HECA AFC	Hydrogen Energy California Application for Certification, May 2009
HEI	Hydrogen Energy International LLC
HMWD	Henry Miller Water District
KCWA	Kern County Water Agency
MCL	Maximum Contaminant Level
MDM	Mount Diablo Meridian
mg/l	milligram(s) per liter

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List of Abbreviations
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MLD	Most Likely Descendant
mmBtu	one million British thermal units
MWh	Megawatt-hour(s)
NAHC	Native American Heritage Commission
OPR	Governor's Office of Planning and Research
PRS	Paleontological Resources Specialist
RWQCB	Regional Water Quality Control Board
SB 97	California Senate Bill 97
SCAQMD	South Coast Air Quality Management District
SCH	State Clearinghouse (of the Governor's Office of Planning and Research)
SJVAPCD	San Joaquin Valley Air Pollution Control District
STWSD	Semitropic Water Storage District
SVP	Society of Vertebrate Paleontology
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency
WEP	Water Exchange Project

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A. BVWSD Water Balance for Years 1970-2007 and BVWSD Forecasted Groundwater Balance for Years 2000-2080

B. BVWSD Groundwater Monitoring Plan

C. Memorandum of Understanding Regarding Operation and Monitoring of the BVWSD Groundwater Banking Program

D. BVWSD Water Management Program Project Summary Matrix

E. Notice of Preparation of a Draft Environmental Impact Report, Notice of Completion and Environmental Document Transmittal Form and Attachments

F. BVWSD Initial Study for the Buena Vista Water Management Program, June 2009

G. Review of the Potential Environmental Impacts of the BVWSD's Proposed Groundwater Recharge and Recovery Project Memorandum from Robert A. Crewdson, Ph.D. to Dan Bartel, BVWSD dated September 20, 2009

SECTION I

EXECUTIVE SUMMARY

SECTION I
EXECUTIVE SUMMARY

Buena Vista Water Storage District (BVWSD or the District) is located in Kern County, approximately sixteen miles westerly of the City of Bakersfield. The District provides water service within its service area to primarily agricultural users. The District's service area is located in the trough of California's southern San Joaquin Valley and comprises approximately 50,000 acres within the lower Kern River watershed. The District utilizes surface water transport (canals) to fulfill approximately three-quarters of the irrigation demand within its service area and fulfills the remaining irrigation demand via replenishment of the groundwater, which is subsequently pumped by the District and local landowners.

The District overlies the Kern County Subbasin portion of the San Joaquin Valley Groundwater Basin. The Kern County Subbasin is currently in a state of overdraft. Pursuant to data for the Kern County Subbasin (2006), in California's Groundwater, Bulletin 118, prepared by California Department of Water Resources (DWR), "…KCWA [Kern County Water Agency] has prepared a detailed long-term water balance from 1970 to 1998, which shows an average change in storage of minus 325,000 AF per year (Fryer 2002).

Despite the overdrafted condition in the groundwater basin, the District stores an average of 46,000 acre-feet per year (AF/yr) of water in the underlying aquifer, above consumptive-use demands, as shown in Buena Vista WSD Water Balance for Years 1970-2007 (see Appendix A). The District seeks to creatively manage these quantities of water with other entities with complementary needs, and, to that end, has developed the Buena Vista Water Management Program (Program).

The Program has been developed in accordance with the District's mission, which is to provide the landowners and water users of the District with a reliable, affordable, and usable water supply, while facilitating programs that protect and benefit the groundwater basin and better utilize water supply resources. The Program consists of four components, each of which is an individual project designed to more effectively and beneficially manage the District's water resources and facilities. The Program will be implemented throughout the Buena Vista Water Storage District service area, the location of which is depicted in Figures 1 and 2 in the Draft Environmental Impact Report (Draft EIR) for the Program.

Environmental impacts resulting from implementation of the Program relate to biological resources, archaeological and historical resources, paleontological resources, soils and water quality, and hydrology.

Environmental impacts resulting from the Program will be avoided or reduced to levels less than significant by incorporation of mitigation measures as set forth in this Draft EIR; therefore, the Program will not result in significant adverse impacts upon the environment.

This Draft Environmental Impact Report (DEIR) is a public information document that has been prepared as part of a thorough environmental analysis performed in order to determine any significant effects that the Program may have on the environment, as defined by the California Environmental Quality Act (CEQA), which is codified in the California Public Resources Code, Title 14, Section 21000 *et seq*, and the State CEQA Guidelines (California Code of Regulations, Section 15000 *et seq*).

SECTION II

INTRODUCTION

SECTION II
INTRODUCTION

A. BUENA VISTA WATER STORAGE DISTRICT

1. Background

BVWSD was organized in July 1924 to manage the irrigation and drainage systems and water rights originally held by Henry Miller and Charles Lux of the Miller and Lux Land Company. The mission of BVWSD is to provide the landowners and water users of the District with a reliable, affordable, and usable water supply, while facilitating programs that protect and benefit the groundwater basin and better utilize water supply resources.

Kern River water began being used for irrigation in and around the Bakersfield area in the late 1850s. Controversies between irrigators in the Bakersfield area and upstream users resulted in the *Lux v. Haggin* suit, decided by the California Supreme Court in 1886, which established the system of water rights still in effect in California today. Despite the court's decision in *Lux v. Haggin*, the disputes continued until they were settled under the terms of the Miller-Haggin Agreement of July 28, 1888. This agreement continues to be the basis of distribution of Kern River flows between the upstream "First Point" interests and the downstream "Second Point" interests. It was amended in 1955 and in 1964, and continues in full force and effect.

The Miller-Haggin Agreement, as amended, allocates all of the waters of the Kern River on a daily basis. The State Water Resources Control Board has previously found and confirmed that no additional water in the Kern River system remains available for appropriation, although a recent court ruling has determined that a forfeiture of water rights has occurred (by a party other than BVWSD). BVWSD was not a party to the litigation, and such determination should not affect BVWSD's water rights.

Under the Miller-Haggin Agreement, the Second Point interests, namely Miller and Lux, were apportioned approximately one-third of the Kern River flows from March through August. A subsequent amendment to the agreement also apportioned to the Second Point interests some of the Kern River flows resulting from winter runoff. The Second Point

water right amounts to an average entitlement of about 158,000 acre-feet per year (AF/yr) of surface water from the Kern River, delivered by First Point interests to the Second Point of measurement, undiminished by delivery losses.

After the death of Henry Miller in 1916, the Miller and Lux Land Company began selling much of its lands to the tenant farmers. Miller and Lux and the new landowners soon realized that a facilitator would be needed to represent the many vested interests of the water right. BVWSD was organized in 1924 to fulfill this need, and began operations following issuance of its 1927 Project Report. BVWSD is now the owner and operator of the irrigation and drainage systems formerly owned by the Miller and Lux Land Company and is the successor-in-interest to the Second Point interests (Miller and Lux) under the Miller-Haggin Agreement, as amended.

2. Location

BVWSD lies in the trough of California's southern San Joaquin Valley, approximately sixteen miles westerly of the City of Bakersfield. The District's Service Area comprises approximately 50,000 acres within the lower Kern River watershed, where historic runoff created the heavy clay soils from former swamp and overflow lands northerly of Buena Vista Lake, and includes that portion of the swamp and overflow lands between the townsites of Tupman and Lost Hills. The location of the District is depicted in Figures 1 and 2.

The District's Service Area is physically divided into two distinct areas, as follows: the Buttonwillow Service Area and the Maples Service Area (collectively, "Service Area"; see Figure 1). The Buttonwillow Service Area comprises approximately 45,000 acres situated northwesterly of the Buena Vista Lake Bed (which consists of agricultural land that is served by Henry Miller Water District [HMWD]). HMWD is a part of BVWSD; however, HMWD is not a part of BVWSD's Service Area. The Maples Service Area comprises approximately 5,000 acres situated easterly of the Buena Vista Lake Bed. Of the District's Service Area, approximately 45,000 acres have been developed, and approximately 35,000 acres are farmed annually to primarily field and row crops.

As described herein, Program components will be initiated in various locations within the District's boundaries; however, the Program is intended to be in effect throughout, and to benefit, the District's entire Service Area.

3. Existing Water Supply and Use

The District controls an average entitlement of approximately 158,000 acre-feet per year (AF/yr) of surface water from the Kern River, based on the Miller-Haggin Agreement of July 28, 1888. In 1973, BVWSD contracted with Kern County Water Agency (KCWA) for an additional surface water supply. Said contract provides an annual firm entitlement of 21,300 acre-feet (AF) and a surplus entitlement of 3,750 AF of State Water Project (SWP) water via KCWA, which serves as the local contracting agency for the SWP. The KCWA has long-term contracts for providing SWP water with thirteen local water districts (termed "member units"), including BVWSD.

The SWP is operated and maintained by the California Department of Water Resources (DWR) and provides water supplies for approximately 23 million Californians and approximately 755,000 acres of irrigated farmland. SWP facilities consist of a water and power development and conveyance system that includes pumping and power plants; reservoirs, lakes, and storage tanks; and canals, tunnels, and pipelines (including the California Aqueduct) that capture, store, and convey water to 29 SWP contractors throughout California, including KCWA.

BVWSD currently has access to SWP water from five turnouts along the California Aqueduct, providing approximately 850 cubic feet per second (cfs) of added gravity inflow capacity directly into the District's distribution system. The District's geographic location relative to the California Aqueduct and to other KCWA member units provides opportunities for exchanging BVWSD's Kern River water for other member units' SWP water.

The District utilizes surface water transport (canals) to fulfill approximately three-quarters of the irrigation demand within its Service Area. The District fulfills the remaining irrigation demand via replenishment of the groundwater, which is subsequently pumped by the District and local landowners. The District has also been a historic user of surplus Friant-Kern Canal flows to serve irrigation demands and for groundwater recharge programs.

The Kern County Subbasin (DWR Bulletin 118, 2003, Figure 37) comprises the entire southern end of the San Joaquin Valley Groundwater Basin, and has been further divided into additional hydrological subbasins based on geophysical electric log analysis and seismic mapping of undulating bedrock structures formed due to folding or faulting (KCWA, 1991). Several of these subbasins exhibit partial or substantial isolation from adjoining parts of the larger basin along some boundaries. The District's Buttonwillow Service Area is located in the so-called Buttonwillow (hydrologic) Subbasin, which exhibits some isolation from the larger main basin to the east and exhibits groundwater behavior which is consistent with the interpreted shape and structural controls of the Buttonwillow Subbasin (Crewdson 2009).

The Kern County Subbasin has been classified by DWR as a critically overdrafted groundwater basin; however, the District has historically been able to achieve a positive groundwater balance, recharging an average of 46,000 AF/yr to the aquifer after consumptive uses, as shown in the Buena Vista WSD Water Balance (see Appendix A) for years 1970 through 2007, and anticipates to be balanced for at least the next eighty years, as shown in BVWSD Forecasted Groundwater Balance (see Appendix A), which assumes full Program implementation. The Buena Vista WSD Water Balance and the BVWSD Forecasted Groundwater Balance were prepared by BVWSD using a methodology developed largely as part of a countywide "Groundwater Mediation" process that was facilitated by KCWA during 2004-2006.

The District has also participated in groundwater banking programs, acquired and managed other supplemental surface supplies, and developed irrigation tailwater recovery programs to ensure its long-term positive balance within the groundwater basin. Additionally, the District monitors both shallow and deep groundwater characteristics in an effort to better understand and manage this important groundwater resource.

Additional details pertaining to the District's monitoring efforts are included in the Buena Vista Water Storage District Groundwater Monitoring Plan (see Appendix B), which was prepared by BVWSD. The Program, as set forth herein, will not conflict with the aforementioned groundwater banking or monitoring programs. Said groundwater banking programs are outlined in the District's Groundwater Status and Management Plan (GSMP, 2002). A copy of the GSMP is available for review at the District office.

Because of the District's appropriative rights on the Kern River, the District has access to large quantities of high-flow Kern River water supplies in wet years. The District has long realized the value of aquifer storage and recovery programs with third parties and has developed and participated in such programs in order to maximize the usage of surplus wet-year water supplies. In 1983, BVWSD entered into a joint banking and recovery program with its southwesterly neighbor, West Kern Water District. In 2002, the District entered into a similar program with one of its easterly neighbors, Rosedale-Rio Bravo Water Storage District. In addition to these two programs, the District has operated various small District storage and recovery programs.

B. ENVIRONMENTAL SETTING

1. Climate

The climate of the Program area is typical of the southern San Joaquin Valley, with temperatures ranging from an average maximum of 98 degrees Fahrenheit (°F) during summer months to an average minimum of 34 °F during winter months. Precipitation averages approximately 5.6 inches per year, with a majority of rainfall occurring during January through March. Average annual and monthly climate data for the local area was obtained from the Western Regional Climate Center website, www.wrcc.dri.edu, and is set forth in Table 1 below.

Table 1 - Climate Data Buttonwillow, California													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Average Max. Temperature (ºF)	56.3	63.2	69.1	76.0	84.8	92.5	98.4	96.7	91.5	81.5	67.4	57.1	77.9
Average Min. Temperature (ºF)	35.1	38.9	43.0	47.2	54.1	60.0	65.3	63.3	57.7	48.7	39.2	34.4	48.9
Average Total Precipitation (in.)	1.08	1.08	0.99	0.55	0.22	0.05	0.02	0.02	0.13	0.27	0.55	0.67	5.62

Source: Western Regional Climate Center data summary for Buttonwillow, California Station (041244) for the period of record January 1, 1940 through December 31, 2008.

2. Geology

The following paragraphs in this section describe the geology within the District's Service Area and have been excerpted from Crewdson, Robert A., in preparation 2009, A Preliminary Evaluation of the Geology, Hydrology, and Groundwater Geochemistry of the Buena Vista Water Storage District, Kern County, California, Sierra Scientific Services, Bakersfield, CA.

The southern San Joaquin Valley is an asymmetric geological basin, which has most recently been filled with Late Pleistocene (since 650,000 years before present) alluvial sediments eroded from the marine sedimentary rocks of the Temblor Range on the west and the granitic rocks of the Sierra Nevada Mountains on the east. The sediments transported from the Temblor Range tend to be unconsolidated clayey silts, whereas the sediments transported from the Sierras tend to be unconsolidated sands and silty sands. These sediments are vertically interbedded where the distal edges of opposing alluvial fans were alternately deposited one on top of the other through geologic time. This zone of overlap constitutes the geological axis of the upper basin and lies much closer to the western edge of the basin because of the relative dominance of the higher rates and volumes of erosion and deposition from sources to the east. The topographic axis of the basin, evidenced by the location of the original, natural course of the Kern River, lies much closer to the western edge of the basin for the same reason.

The Late Pleistocene epoch in California and the western United States was a geologic period of glacial and interglacial activity. In some parts of the San Joaquin Valley, laterally extensive clay layers, such as the Corcoran Clay layer, are interbedded with the alluvial sediments. These clay layers are interpreted to be the deposition of glacial fines in quiet lacustrine environments; however, no such clay deposits have been recognized under the District. The very latest sediments to be deposited in the area are the organic-rich silts and clays (of the Lokern series), which are the result of low-velocity, seasonal sedimentation due to outflow from the Buena Vista Lakebed.

The long, narrow Buttonwillow Service Area straddles the old Kern River course and overlies the geological axis of the basin. The geologic strata down to a depth of at least 600-700 feet beneath the District consist of these interbedded alluvial deposits. Unlike other parts of the basin, there is no laterally expansive clay layer comparable to the Corcoran Clay layer, which serves to separate the saturated zone into unconfined and confined aquifers in those areas. However, the depth to groundwater is very shallow in the northern portion of the District, and this may, in part, be attributed to slow percolation through locally-shallow strata with lower permeability.

3. Land Use

The District's Service Area is primarily agricultural. Cotton is the dominant crop; however, cropping patterns have been shifting due to poor market conditions for cotton. The main shift has been from cotton to alfalfa, grains, pistachios, and fallow. The cropping pattern within the District's Service Area in 2008 is listed in Table 2 below.

Table 2 Crops Within BVWSD Service Area in 2008		
Crop	**Acreage**	**Percent of Total District Cropping Pattern**
Cotton	13,400 acres	38%
Alfalfa	10,100 acres	28%
Grains	5,300 acres	15%
Pistachios	3,400 acres	10%
Miscellaneous Field Crops	3,200 acres	9%

Total crop water consumptive use peaked in the mid-1970s, averaging approximately 113,000 AF/yr. Total crop consumptive use has since declined, and averaged approximately 99,500 AF/yr during the period 2000-2007. Total known spatial crop consumptive use for the Buttonwillow Service Area in 2003 is shown in Figure 3.

4. Groundwater

The landowners within the District have long realized the importance of their groundwater supply. District staff, as directed by the Board of Directors, began monitoring the groundwater as early as the 1940s. Today, the District not only maintains detailed surface water delivery records, but comprehensive groundwater monitoring records as well. Both of these programs have progressed with new technologies and as new concerns for the basin's protection materialize.

Figures 4 and 5 show, respectively, District-wide depths to groundwater and shallow, perched groundwater in 2008. Between 2003 and 2008, depth to groundwater levels generally increased (i.e., water levels are generally deeper below ground surface) by approximately 10 to 30 feet[1] below ground surface within the District's Buttonwillow Service Area (see Figure 4). Immediately south of the Buttonwillow Service Area, the

[1] See also Figure 3 "Depth to Groundwater Map, December 2003" included in the document Buena Vista Water Storage District Initial Study and Mitigated Negative Declaration for the 2006 Groundwater Transfer Program (October 2006), a copy of which is available for review at the District's office.

District has historically recharged wet year supplies in cooperation with the Tule Elk Reserve State Park. The historic sloughs in the Park are very pervious and are thus able to receive large, long-term recharge flows within relatively small recharge areas. This activity reduces the groundwater gradient to the south, and helps maintain low TDS levels in this area.

According to the District's groundwater monitoring records, much of the northern part of the District (generally north of Dargatz Road) suffers from an extremely shallow perched groundwater aquifer that encroaches into the root zone of the crops (see Figure 5). During spring, groundwater levels range from approximately two to ten feet below ground surface for much of the northern portion of the District's Buttonwillow Service Area. Approximately 12,000 to 15,000 acres are affected by shallow perched groundwater conditions within the District.

The entire Buttonwillow Service Area is underlain by a single, thick sequence of interbedded sands and silty sands from the ground surface to depths exceeding 700 feet. Throughout the District, the sandy zones are known to yield groundwater at higher flow rates than the silty zones, as would be expected. The entire water-bearing interval is considered to be a single aquifer except in the northern portions of the Buttonwillow Service Area, where a shallow perching layer isolates a persistent zone of shallow, perched, salty groundwater from the underlying aquifer (Crewdson 2009).

Some portions of the Buttonwillow Service Area overlie aquifers characterized by concentrations of salinity or "total dissolved solids" (TDS) that exceed the California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 1,000 mg/l. In the southern portions of the Buttonwillow Service Area (i.e. south of 7th Standard Road), the TDS content of the groundwater varies from 300 to 1,000 mg/l (refer to Figure 6).

In the northern portions of the Buttonwillow Service Area, the TDS content of the groundwater varies from 1,000 to 4,000 mg/l (refer to Figure 6). Within the shallow, perched groundwater zone within the northern portions of the Buttonwillow Service Area (i.e., north of 7th Standard Road), the TDS content varies from 1,000 to 5,000 mg/l (refer to

Figure 7) (Crewdson 2009). Ground surface elevations within the District are shown in Figure 8, and groundwater elevations within the District are shown in Figure 9.

The presence of shallow perched groundwater and elevated TDS concentrations have adversely impacted plant growth and crop yields in affected areas of the District. According to Water Quality for Agriculture (Ayers and Westcot 1976, 1985), "Yield reductions occur when the salts [TDS] accumulate in the root zone to such an extent that the crop is no longer able to extract sufficient water from the salty soil solution, resulting in a water stress for a significant period of time. If water uptake is appreciably reduced, the plant slows its rate of growth." Ayers and Westcot further state that "For crops irrigated infrequently, as is normal when using surface methods and conventional irrigation management, crop yield is best correlated with the average root zone salinity."

Table 3 below provides guidelines for irrigation water quality, and information contained therein has been obtained from Ayers and Westcot *Table 1 Guidelines for Interpretation of Water Quality for Irrigation*.

Table 3
Guidelines for Water Quality for Irrigation

Salinity (affects crop water availability)	**Units**	**Degree of Restriction on Use**		
		None	**Slight to Moderate**	**Severe**
EC_w (1)	dS/m	< 0.7	0.7 - 3.0	> 3.0
(or)				
TDS	mg/l	< 450	450-2000	> 2000

(1) EC_w means electrical conductivity, a measure of the water salinity, reported in deciSiemens per meter at 25ºC (dS/m) or in units millimhos per centimeter (mmhos/cm); dS/m and mmhos/cm are equivalent. TDS means total dissolved solids, reported in milligrams per liter (mg/l).

C. PURPOSE AND SCOPE OF EIR

1. Compliance with CEQA

This document has been prepared in compliance with the provisions of the California Environmental Quality Act, codified in California Public Resources Code, Title 14, Section 21000 *et seq* (CEQA), and the State CEQA Guidelines (California Code of

Regulations, Section 15000 *et seq*). CEQA and the State CEQA Guidelines require the preparation of an Environmental Impact Report (EIR) for any action that has the potential to significantly affect the quality of the environment. This Draft EIR (DEIR) for the Buena Vista Water Management Program (Program) has been prepared by Krieger & Stewart, Incorporated under contract with BVWSD to comply with the provisions of CEQA. A description of the Program is set forth in Section III herein.

2. Lead Agency

The District is lead agency under CEQA for the Program, as it is the public agency with the primary responsibility for preparing CEQA documents and for approving, funding, and carrying out the Program.

BVWSD is organized in accordance with California Water Storage District Law (California Water Code, Division 14, Section 39000, *et seq*) with the powers and authorities set forth in said code, including the powers of acquiring, improving, and operating works for the storage and distribution of water. BVWSD is empowered to plan, construct, operate, maintain, repair, and replace water system facilities as needed to provide water service in compliance with applicable standards and regulations. In addition, the District is specifically authorized to put its water supplies to beneficial use, and to that purpose may sell, distribute, or otherwise dispose of water and water rights not immediately necessary for the uses and purposes of the district (see for example Water Code Section 43001).

If HEI participates in the BGRP component of the Program (refer to Section III herein), then the California Energy Commission (CEC) will be lead agency under CEQA for facilities included in the BGRP that would serve the Hydrogen Energy California (HECA) power plant. Said facilities would be subject to the environmental review and mitigation requirements of the CEC in addition to those set forth herein.

3. Public Information Document

This is a public information document. Information contained herein is intended to address the environmental impacts expected to result from the proposed Program, and to satisfy the disclosure requirements of CEQA and the State CEQA Guidelines.

The purpose of this DEIR is to provide decision makers, public agencies, and the general public with an objective and informational document that fully discloses the potential environmental effects of the proposed Program. The EIR process is designed to facilitate the objective evaluation of potentially significant environmental impacts (direct, indirect, and cumulative) of the proposed Program and its alternatives. It also identifies mitigation measures intended to avoid or reduce to a level less than significant any adverse environmental impacts that may result with implementation of the Program.

It should be noted that addressing a potential environmental impact in the DEIR does not imply that a significant adverse environmental impact would actually occur if the proposed Program is implemented.

SECTION III

PROGRAM DESCRIPTION

SECTION III
PROGRAM DESCRIPTION

A. PROPOSED PROGRAM

The primary water management objective of the Buena Vista Water Storage District (BVWSD) is to benefit the lands, landowners, and water users within its boundaries through a more economic and efficient distribution and use of available water supplies. In 2007, court decisions greatly impacted the ability of the State Water Project and Central Valley Project to conduct Delta pumping operations for their contract holders, which, combined with drought conditions, has thrust California into a water supply crisis.

In an effort to better maximize the benefits of District assets and creatively assist other water users, the District is considering implementing the Buena Vista Water Management Program (Program), which consists of four components designed to more effectively and beneficially manage the District's water resources and facilities. Said components are listed and described below. BVWSD's Water Management Program consists of implementing some or all of the following components.

Component 1: Groundwater Recharge and Recovery Project (GRRP)
Component 2: Water Exchange Project (WEP)
Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)
Component 4: Brackish Groundwater Remediation Project (BGRP)

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

BVWSD has historically stored water in the underlying groundwater basin. In addition to the District's existing groundwater banking programs, the GRRP will store water within, and recover the additional stored groundwater from, the groundwater basin.

The GRRP consists of groundwater recharge that will be conducted through direct recharge methods, in-lieu methods, or a combination of these. The District has conducted and will continue to conduct direct recharge by percolating surface water to the groundwater basin via canal seepage, recharge ponds, and irrigation deep percolation. Total District groundwater replenishment currently exceeds total District groundwater

extraction by an annual average of approximately 46,000 acre-feet per year (AF/yr), as shown in Appendix A.

According to the Buena Vista Water Storage District 2005 Full Well Survey (BVWSD 2005), there are approximately 200 groundwater wells within District boundaries. Of these wells, seven are District-owned, and the remainder are landowner-owned. The GRRP includes the construction of up to seventeen additional District-owned groundwater recovery wells over the life of the GRRP in order to provide adequate recovery capacity and necessary operational flexibility.

Groundwater recovery pursuant to the GRRP may include the use of District wells, the indirect use of landowner wells throughout the District via reductions in surface water supply allocations, the use of individual volunteer landowner wells pursuant to agreements with the District, the use of other wells within the District's Service Area, or a combination of these. The GRRP's ultimate additional annual recovery above existing conjunctive-use and project demand could be up to 20,000 AF/yr, and the District will manage resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.

2. Component 2: Water Exchange Project (WEP)

BVWSD's Water Exchange Project (WEP) will allow the District to deliver portions of its water supplies to other entities in exchange for the later return of more regulated (less varied) water supplies. Because of the District's water rights on the Kern River, the District has access to large quantities of Kern River water supplies in wet years. Historically, the District has utilized methods for using and storing its wet-year supplies for later use. One such commonly used method is an "exchange". In an exchange, the District delivers a portion of its surplus wet-year supplies to another entity. The other entity later returns a predetermined or negotiated quantity of its regulated water to the District, with or without an additional financial consideration.

One potential participant in the WEP component is Poso Creek Water Company, who may receive water supplies for delivery into its share of the Semitropic Banking Project. Potential environmental impacts associated with the construction and operation of the Semitropic Banking Project have already been analyzed in a separate environmental analysis available from Semitropic Water Storage District. Other potential participants in the WEP may include, but are not limited to, regular operational exchange contractors, their banking project participants, or both, such as Cawelo Water District, Kern Delta Water District, North Kern Water District, Rosedale-Rio Bravo Water Storage District, Semitropic Water Storage District, and Improvement District No. 4 of the Kern County Water Agency.

The WEP will ultimately allow the District to better manage its water supplies by effectively increasing supply availability to BVWSD during dry years. The District will manage said supplies with in-District entities, out-of-District entities, or a combination of these.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The northern portion of the Buttonwillow Service Area, generally northerly of Lerdo Highway, is often referred to as the "Northern Area Lands". Some portions of said lands are encumbered (or will be encumbered) by conservation easements; overlie shallow perched aquifers with elevated levels of TDS, ranging from approximately 1,000 to 5,000 mg/l (refer to Figure 7); and have poor drainage characteristics. Conservation easements typical to this area are encumbrances which are legally enforceable land preservation agreements between a landowner and a government agency or a qualified land protection organization for the purposes of conservation such as the United States Department of Agriculture's Wetlands Reserve Program. The primary purpose of a conservation easement is to protect land from certain forms of development or use.

The conservation easements typically require that 40% of the surface water that would be typically available to the land in any one year still be made available to such land. The remaining 60% of the water can be used on other land; however, present District allocation policies allow this water to be used only on other land within the District.

BVWSD's CEWAMP consists of acquiring and actively managing some or all of the water service rights in the Northern Area Lands that have already entered into, or that will enter into, conservation easement programs and that have transitioned away from full agricultural production.

Water intended for inclusion in the CEWAMP does not include water that has been designated for use in habitat restoration by conservation easements. The District anticipates that approximately 5,000 acres of land have been or will be encumbered by conservation easement programs and, as a result, irrigation demands on these lands have been significantly reduced, resulting in an estimated potential net water availability of approximately 5,000 AF/yr. The District will manage resultant water supplies through programs with in-District entities, out-of-District entities, or a combination of these.

Implementation of the CEWAMP may include one or more of the following:

- Leasing or otherwise acquiring an interest in agricultural land that would then be allowed to lie fallow, allowing the water that would have been used to irrigate said land to be used elsewhere;

- Acquiring the water service rights from owners within the Northern Area Lands, such as buying back water use allocations from current users;

- In-District remarketing, including marketing water obtained through the above methods for use or sale within the District;

- Other methods that may be developed during the environmental review and planning process.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Certain areas in the northern portion of the Buttonwillow Service Area overlie aquifers characterized by TDS concentrations exceeding the California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 1,000 mg/l. TDS concentrations in these northern areas (generally north of 7th Standard Road) typically range from 1,000 to

4,000 mg/l. The southern portion of the Buttonwillow Service Area has lower TDS concentrations ranging from 300 to 1,000 mg/l, as shown in Figure 6. A shallow perched groundwater zone within the northern area contains TDS concentrations typically ranging from 1,000 to 5,000 mg/l, as shown in Figure 7.

The BGRP is designed to remediate brackish groundwater conditions and shallow, perched groundwater conditions within the Buttonwillow Service Area by recovering brackish groundwater and shallow brackish perched groundwater from strategic locations within the aquifer. As described in II(B)(4) herein, shallow perched groundwater conditions and elevated TDS concentrations have adversely impacted plant growth and crop yields in affected areas of the District.

While some crops are more salt-tolerant than others, all crops suffer and yields decline as groundwater TDS concentrations increase. Growers on lands overlying higher-TDS groundwater have fewer choices of viable crops, and achieve lower yields on those crops, than growers on lands overlying lower-TDS groundwater (Crewdson 2009).

The BGRP consists of constructing and operating strategically-located shallow- and medium-depth brackish groundwater recovery wells and collection and conveyance pipelines that will recover and transport brackish groundwater to participants at receiving facilities located either inside or outside District boundaries.

The District has identified two types of brackish groundwater problems and has designated two corresponding target areas for remediation, termed Target Area A and Target Area B, which are depicted in Figure 10 and are described in additional detail below. The BGRP includes extraction of up to 12,000 AF/yr of brackish groundwater from Target Area A, Target Area B, or a combination of these areas.

Placing the brackish water back into the ground nearby would not result in a benefit. The initial extent of the BGRP depends upon the rate and volume of brackish water that the District can continually dispose of by delivery to one or more brackish water users. Therefore, implementation of the BGRP in Target Area A and in Target Area B will each include extraction of brackish groundwater, which the District will transport and deliver to one or more brackish water users who are ready, willing, and able to participate in the

BGRP. Potential environmental impacts associated with the construction and operation of participating users' receiving facilities are beyond the scope of this document and will be addressed by the user receiving such brackish water, or by the lead agency for the user's CEQA process.

Potential BGRP participating users have not yet been identified, with the exception of Hydrogen Energy International LLC (HEI), which is contemplating participating in the BGRP as a user to receive brackish groundwater at a future power plant. Potential facilities that would be constructed and operated to serve HEI, should it become a participating user, are described in additional detail in *Target Area B* below.

Target Area A

Target Area A is located throughout the northern portion of the Buttonwillow Service Area generally north of 7th Standard Road, as depicted in Figure 10. A shallow brackish perched groundwater aquifer exists throughout most of this area, typically standing at depths of two to ten feet below ground surface (see Figure 5) and having TDS concentrations ranging from 1,000 to 5,000 mg/l (see Figure 7).

The intent of the BGRP in Target Area A is to improve these lands for agricultural use by physically lowering the level of the shallow brackish perched groundwater aquifer by aquifer dewatering. An additional benefit of this is the possible improvement in groundwater quality in Target Area A.

Implementation of the BGRP in Target Area A includes construction and operation of up to 40 very shallow, low-flow brackish groundwater extraction wells (Target Area A wells) in a grid-array orientation designed to uniformly lower the widespread shallow, perched groundwater. The District has previously experimented with drainage systems to lower the perched groundwater, and with positive results; therefore, the District is aware that a physical lowering of the shallow perched groundwater level is sufficient for improving the growing conditions in the type of problem area typical of Target Area A (Crewdson 2009). Proposed Target Area A wells will additionally include associated transmission and conveyance pipelines, appurtenances, and access features. At this time, potential participants in the BGRP for Target Area A have not yet been identified.

Target Area B

Target Area B is located in lands within the Buttonwillow Service Area that overlie deeper aquifer zones that contain brackish groundwater that occurs in the general depth interval from 200 to 700 feet or more below ground surface. Depth to groundwater in Target Area B, the location of which is depicted in Figure 10, ranges from approximately 20 to 80 feet below ground surface (Crewdson 2009).

Groundwater TDS concentrations in this area broadly range from 700 to 4,000 mg/l, but localized areas and zones containing elevated TDS concentrations in the range of 2,000 to 4,000 mg/l occur along the western District boundary. Target Area B lands overlie part of the larger aquifer system which receives lateral (horizontal) recharge waters from two different sources. Lower-TDS water recharges the aquifer from the east, higher-TDS water recharges the aquifer from the west, and different areas within the Buttonwillow Service Area overlie different types of water (Crewdson 2009).

After decades of irrigation pumping, the District has determined that it is not possible to remove the higher-TDS water from the aquifer simply by extraction in Target Area B, because lateral recharge from the west brings in the brackish groundwater faster than it can be removed. Additionally, existing wells within the District are not specifically situated so as to achieve any such deliberate, permanent extraction. Therefore, the brackish groundwater must be extracted from strategic locations to reduce lateral recharge from the west (Crewdson 2009).

To remediate brackish groundwater conditions in Target Area B, the District intends to construct and operate up to ten brackish groundwater extraction wells in Target Area B. The initial phase of the BGRP includes five proposed Target Area B wells that are preliminarily situated in a linear formation along the approximate center of the western boundary of the Buttonwillow Service Area, in Sections 34 and 35, Township 28 South, Range 22 East and Sections 1, 2, and 12, Township 29 South, Range 22 East MDM.

These five wells, as shown in Figure 10, have been preliminarily sited in such a manner to intercept the inflow of brackish groundwater from the west, creating a "salt-shadow" to the east of the wells. The conceptual design includes a northwesterly trending line of five wells (three operational and two redundant), each spaced at intervals of approximately

one-quarter mile and drilled to depths of approximately 300 to 400 feet below ground surface. This configuration is intended to result in a zone of blending to the east of these five Target Area B wells in which the lower-TDS water from the east will have a greater impact on the overall TDS concentration within that zone than the higher-TDS water from the west (Crewdson 2009). The final locations, spacing, and depths of said wells will be determined during well field design, installation, and testing.

The initial zone of benefit for Target Area B is projected to be located directly east of the five proposed initial Target Area B wells (preliminary locations of which are shown on Figure 10), and its beneficial impact will grow slowly over time. The rate of increase and ultimate size of the zone of benefit will depend on the long-term extraction rate, aquifer properties, and locations of additional Target Area B wells (Crewdson 2009).

The BGRP in Target Area B includes constructing and operating the following facilities:

- Ten Target Area B wells, five of which are preliminarily located as shown on Figure 10, with the remaining five wells to be constructed as needed to obtain the full capacity of the BGRP;
- Brackish groundwater conveyance pipeline(s), and
- Associated structures, appurtenances, and access features.

The scope of the initial phase of the BGRP will be determined by the rate and volume of brackish water that the District can continually dispose of by delivery to an initial, long-term consumer of the brackish water. The ultimate number (up to ten) of Target Area B wells will depend upon the following three factors:

1. The locations, depths, and flow rates that would create the greatest benefit to the aquifer TDS concentrations;

2. The volume of recovered water that the District can dispose of by conveyance to brackish water consumers; and

3. The cost of constructing and operating BGRP facilities in Target Area B.

The locations and extent of the brackish groundwater conveyance pipeline(s) depend upon the locations of the receiving facilities.

One potential participant in the BGRP for Target Area B is Hydrogen Energy International LLC (HEI), who is considering participating in the BGRP as a brackish water user. If HEI participates, it may receive up to 7,500 AF/yr of brackish groundwater from the District for use as process water at its proposed Hydrogen Energy California power plant facility (HECA power plant), as set forth in its Revised Application for Certification for Hydrogen Energy California, Kern County, California (Volumes I and II), prepared by URS and submitted to the California Energy Commission (CEC) on May 28, 2009. This document is hereinafter referred to as the HECA AFC, and is available to the public on the CEC website at www.energy.ca.gov/sitingcases/hydrogen_energy/index.html.

The HECA power plant is currently in the planning stages and is preliminarily located in Section 10, Township 30 South, Range 24 East, MDM, in the southerly portion of the Buttonwillow Service Area as shown on Figure 10. The HECA power plant project is subject to separate environmental review and approval by the California Energy Commission (CEC). CEC is lead agency pursuant to CEQA for the HECA power plant project and will prepare and adopt appropriate CEQA-equivalent documents for the HECA power plant project. Therefore, Target Area B wells, pipelines, appurtenances, and access features that would serve the HECA power plant, if HEI participates in the BGRP, would be subject to any mitigation measures required by CEC in addition to those set forth in this EIR.

In the event that HEI becomes a participant in the Program, the initial five proposed Target Area B wells will serve the HECA power plant, and a brackish water conveyance pipeline (HECA pipeline) will be included in the BGRP in order to convey brackish groundwater from the Target Area B wells to the HECA power plant. The initial five Target Area B wells and the HECA pipeline are shown on Figure 10 herein.

The HECA pipeline is anticipated to consist of a belowground pipeline, approximately twenty inches in diameter and approximately fifteen miles in length, extending from the initial five proposed Target Area B wells to the HECA power plant. The HECA pipeline

would be installed predominately within the District's unpaved service road that is located along the eastern bank of the West Side Canal, and would traverse the following sections:

- Sections 27, 28, and 34, Township 28 South, Range 22 East;
- Sections 1, 2, and 12, Township 29 South, Range 22 East;
- Sections 7, 17, 18, 20, 21, 27, 28, 34, 35, and 36, Township 29 South, Range 23 East;
- Section 1, Township 30 South, Range 23 East; and
- Sections 5, 6, 8, 9, 10, and 15, Township 30 South, Range 24 East.

BGRP facilities described herein, with the exception of the HECA pipeline, will be constructed whether or not HEI becomes a participant in the BGRP. Environmental impacts resulting from implementation of the BGRP will be assessed and mitigated as set forth herein. Environmental impacts resulting from construction and operation of facilities intended to serve the HECA power plant will be mitigated as set forth herein and will also be subject to CEC's environmental review process and any additional mitigation measures required by CEC, as lead agency pursuant to CEQA for the HECA power plant.

Annual brackish groundwater recovery anticipated by the BGRP could be up to 12,000 AF/yr, of which approximately 7,500 AF/yr may be conveyed to the HECA power plant in the event that HEI participates in the BGRP. Remaining quantities may be extracted from either Target Area A or Target Area B using wells constructed pursuant to the BGRP, existing District wells, existing landowner wells, tile drainage systems through individual volunteer landowner agreements, or other methods designed to extract, convey, and dispose of brackish groundwater that may be developed during the environmental review and planning process. The District will manage resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.

B. PURPOSE

The District's primary water management objective is to benefit the lands, landowners, and water users within its boundaries through the most economic and efficient distribution and use of available water supplies. The intent of the Program is to improve the efficiency of water management within the District by implementing all or a combination of the following:

- Infiltration and storage in the groundwater aquifer of available then-surplus water supplies, which may be later recovered as needed via either District or landowner wells;
- Exchanges with other entities to better accommodate the District's dry-year demands;
- Conservation by acquiring and managing water service rights on land that has been encumbered by conservation easements (The Program will include water that is not earmarked for habitat restoration.); and
- Increasing available water supplies and improving certain areas of the Buttonwillow Service Area for agricultural use by extracting and transporting brackish groundwater, shallow perched groundwater, or both from said areas.

The Program is proposed in order to provide effective and beneficial management of the District's water supply through exchanges, water conservation, groundwater recharge and recovery, and other means described herein. Through implementation of the Program, the District desires to ensure a continuously reliable, affordable, and usable water supply for District customers, and to facilitate programs that protect and benefit the groundwater basin. The Program will benefit the lands, landowners, and water users within the District's boundaries by increasing the efficiency of use and distribution of available water supplies, which will be used to further improve services within the District.

SECTION IV

PROGRAM ALTERNATIVES

SECTION IV
PROGRAM ALTERNATIVES

In developing the Program, the District evaluated numerous potential projects in order to determine those that would best improve water management conditions within the District while minimizing adverse environmental impacts and facilitating the District's mission of providing the landowners and water users within its service area a reliable, affordable, and usable water supply. Alternative A, the proposed Program, combines four projects that have been determined most feasible by the District.

A. PROPOSED PROGRAM

Alternative A consists of the Program as set forth herein. The four components of the Program (GRRP, WEP, CEWAMP, and BGRP) were included in a selection matrix with eight other alternatives as part of a preliminary feasibility study performed by the District. A copy of the matrix is included in Appendix D. The matrix scored each alternative based on financial considerations and a complexity/difficulty analysis of the following factors: source of supply, District policies, adjoining entities issues, legal, environmental factors, CEQA, permitting, and project development.

The overall score was based on a summation of the different groupings of category scores and adjusted so that each overall score was on a scale of zero to 1,000. The lowest scores received the highest priority for inclusion in the Program. The four components chosen for the Program were selected because they are less complicated, result in fewer environmental impacts, and are timelier than the other alternatives that were analyzed.

An alternative to the GRRP was considered during preparation of the DEIR, which included the GRRP as set forth herein, but added replacement of the well pumps at the eleven diesel fuel and natural gas powered well pumping plants within the District's Service Area with electric motor well pumps. This would reduce direct greenhouse gas emissions by 11% per year, but increase indirect greenhouse gas emissions by 6% per year, resulting in a 5% net reduction in annual greenhouse gas emissions generated by existing well pumping plants.

All District-owned well pumping plants are powered by electric motor well pumps, and well pumping plants proposed for construction pursuant to the GRRP and the BGRP will be powered by electric motor well pumps. The District determined that the incremental environmental benefits of replacing the eleven existing non-electric powered well pumping units within the District with electric-powered well pumping units pursuant to this alternative was not justified. It was suggested that landowners would not be willing to incur the cost of replacing pump drivers that are in good working condition. Therefore, this alternative was excluded because of the minimal environmental benefits, the costs involved, and the anticipated lack of landowner cooperation. The environmental benefits of this alternative may alternatively be achieved gradually over time as the existing non-electric powered well pumping units reach the end of their useful life and are replaced with well pumps powered by electricity, or are similarly replaced due to rising costs of fossil fuels and stricter air quality standards.

A selection of the other alternatives considered by the District is represented in subsections B through F below.

B. ON-FARM WATER USE EFFICIENCY PROGRAM

To implement the On-Farm Water Use Efficiency Program, the District would offer incentive grants to be used toward the purchase and installation of efficient irrigation technology. This would reduce Main Drain flows, promote better on-farm irrigation management, and ease the transition into permanent or higher-valued crops. The Main Drain is an irrigation runoff channel that collects and carries drainage runoff through the District's Buttonwillow Service Area. It begins in the southeast portion of the District and merges with the Goose Lake Canal northerly of the Buttonwillow Service Area.

This alternative is anticipated to result in few environmental impacts; however, it is more complicated to implement, and possibly more costly, than the projects selected for inclusion in the proposed Program (Alternative A). Although it remains a viable option for possible future programs, Alternative B was not selected for inclusion in the Program.

C. OFF-STREAM STORAGE RECLAMATION PROJECT

Currently the District has an interconnection with the Semitropic Water Storage District (STWSD) that is used to transfer water into BVWSD's system, and also to transport reclaimed tailwater for delivery to STWSD's system. Annual deliveries to STWSD have varied from 1,000 to 10,000 AF. With some of the Northern Area Lands in BVWSD entering into conservation easement programs, demands for reclamation pumping within the District have been reduced.

The Off-Stream Storage Reclamation Project would include constructing facilities that would allow storage of water for later use. By constructing a storage reservoir, a pumping plant forebay, or both, and making additional pumping capacity improvements, the District could deliver an additional 1,000 AF of its tailwater each year. Another possibility would be storage for intermittent surplus flows, which could provide an additional 1,000 AF annually, depending on the capacity of the reservoir.

The agricultural market experiences large conditional fluctuations and the state often experiences water supply challenges, such as prolonged drought and pumping restrictions (e.g. 2007 U.S. District Court ruling to reduce delta water production in order to protect the threatened delta smelt). Such challenges may make projects like this attractive and viable for implementation as part of future programs, because additional storage during periods of abundance will be beneficial in supplying District water users during subsequent dry years.

Implementation of Alternative C is anticipated to be complicated and costly for the District; therefore, this alternative was eliminated from consideration as part of the Program.

D. ALTERNATIVE LOCATIONS

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The specific locations of wells proposed pursuant to the GRRP have not yet been selected; therefore, there are no alternative locations to consider for the GRRP at this time. Environmental sensitivity will be considered when selecting the sites of the GRRP wells. Because of the prevalence of Farmland within the Buttonwillow Service Area, facilities pursuant to the GRRP will be constructed on existing Farmland (refer to

Agriculture Resources in Section V) or on other previously disturbed land. Mitigation measures included in Sections V and X herein are intended to avoid or reduce adverse environmental impacts of the GRRP to a level less than significant.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities by the District; therefore, there are no locations for which to consider alternatives. Any facilities proposed by Program participants as part of their participation in the Program will be addressed by said participants in separate environmental analyses, as appropriate, in compliance with CEQA.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities by the District. Northern Area Lands from which the District proposes to acquire and manage water service rights are those that meet specific criteria, such as encumbrance with a conservation easement and reduced or eliminated agricultural use. The CEWAMP does not include water that has been designated for use in habitat conservation. Therefore, there are no alternative locations to consider, as lands included in the Program will be determined based on selection criteria described herein.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

The District considered two target areas for locating the brackish groundwater extraction wells proposed pursuant to the BGRP, namely Target Area A and Target Area B, which are depicted in Figure 10. Each of these target areas suffers from different types of brackish water problems that adversely impact irrigated crops.

The locations of up to 40 shallow brackish groundwater extraction wells proposed for lowering the shallow perched water levels in Target Area A have not yet been selected. These wells will be located in a manner that will facilitate lowering shallow perched groundwater levels in the northern portion of the Buttonwillow Service Area. For these reasons, there are no potential alternative locations for these wells.

Five of the ten proposed Target Area B wells have been preliminarily located in a manner that will facilitate interception of brackish groundwater inflow from the west; therefore, alternative locations that vary significantly from those proposed may not meet the objectives of the BGRP in Target Area B. Locations of the remaining five Target Area B wells included in the BGRP would be located in a manner that will facilitate the most efficient and beneficial recovery and disposal of brackish groundwater, while minimizing environmental impacts. Therefore, there are no alternative locations to consider for Target Area B wells.

Alternatives that may be considered during environmental review, planning, and implementation of the BGRP consist of the following:

- Determining the quantities that will be extracted from each target area (Target Area A and Target Area B;

- If HEI becomes a participant in the BGRP, considering alternatives for extracting the quantities of brackish groundwater remaining in the BGRP after quantities extracted and conveyed to the HECA power plant; and

- Considering other methods that may be used to extract, convey, and dispose of brackish groundwater.

E. REDUCED SCALE OR SCOPE

As discussed above, the District considered numerous alternatives during its process of developing the Program. The four projects included in the Program, as well as their scope, have been determined feasible by the District for immediate implementation. The District has determined that the scale and scope of the Program is appropriate, and a reduction in the scale or scope of the Program or its project components may render it ineffective or economically infeasible.

F. NO-PROGRAM ALTERNATIVE

Under the No-Program Alternative, the Program would not be implemented, and the potential environmental impacts identified in association with implementing the Program (described in Section V herein) would not occur; however, the No-Program Alternative could result in a reduction in the quantity of water available for beneficial use. Groundwater storage and water exchanges pursuant to the Program would not occur, water service rights in Northern Area Lands encumbered by conservation easements would not be made available for beneficial use, and brackish groundwater would not be extracted; thus, groundwater quality and conditions for agricultural use would not improve in the affected areas.

If the GRRP is not implemented, up to seventeen additional District groundwater extraction wells and their associated pipelines, appurtenances, and access features would not be constructed and operated; additional groundwater recharge proposed pursuant to the GRRP would not occur; and quantities of water readily available to water users could decrease. With the current uncertainty of SWP water availability, water security within the District may be compromised, resulting in an increase in water demands for the area.

The only known environmental advantages of not implementing the GRRP are the elimination of environmental impacts that may result from construction and operation of facilities pursuant to the GRRP wells. However, mitigation measures incorporated into the GRRP would avoid or reduce to a level less than significant any potential environmental impacts that may result from implementation of the GRRP. Therefore, there is no significant environmental benefit in not implementing the GRRP.

If the WEP is not implemented, then additional quantities of Kern River water present during wet years may contribute to flooding or other less beneficial uses rather than being available for use by Program participants and subsequently being made available for use by the District during dry periods, via an exchange. Further, there are no known significant environmental advantages to not implementing the WEP.

If the CEWAMP is not implemented, then the District would not acquire and manage the water service rights of lands encumbered by conservation easements, and associated water supplies (those not allocated for use in habitat restoration) may go to less beneficial uses rather than being available for use by the District. There are no known significant environmental advantages to not implementing the CEWAMP.

If the BGRP is not implemented, up to 40 shallow, low-flow groundwater wells; up to ten medium-depth, high-flow groundwater wells; the HECA pipeline; and associated pipelines, appurtenances, and access features would not be constructed or operated. Resulting minimal groundwater drawdown in the area would not occur. Approximately 15.4 acres of Farmland would not be converted to non-agricultural use (refer to *Agriculture Resources* in Section V). Brackish groundwater and shallow brackish perched groundwater would not be extracted from aquifers underlying portions of the Buttonwillow Service Area; therefore, TDS concentrations within said portions of the Buttonwillow Service Area would not decrease, and shallow perched groundwater aquifer dewatering would not occur.

Additionally, if the BGRP is not implemented, HEI would need to find an alternative source of process water for the HECA power plant and may select a water source that would be more suitable for agricultural or domestic use. Without treatment, the brackish groundwater supply is not very suitable for agricultural or drinking water uses. Furthermore, the District would not receive the revenue from the sale of brackish groundwater to HEI or other potential recipient facilities. The environmental benefit of not implementing the BGRP is the elimination of environmental impacts that would result from construction and operation of facilities pursuant to the BGRP, and this benefit does not outweigh the water management benefit of implementing the BGRP.

In summary, the No-Program Alternative provides insignificant environmental advantages over the proposed Program. Environmental impacts of the Program as proposed herein are avoided or reduced to a level less than significant as discussed in Sections V and X. The No-Program Alternative may serve to compromise future water security and water quality within the District's Service Area, and water supply management within the District would not improve.

G. RECOMMENDATION

Based on the District's selection process, the GRRP, WEP, CEWAMP, and BGRP, each as proposed herein, have been determined as the projects that will best meet the District's needs for improved water supply management and increased beneficial use of available water supplies. Said projects have been included in Alternative A, the proposed Program. Therefore, for the reasons stated above, Alternative A is recommended as the alternative that best meets the District's objectives while avoiding or reducing environmental impacts to levels less than significant. Any adverse environmental impacts of the Program (refer to Section V) are avoided or reduced to a level less than significant by incorporating the mitigation measures set forth in Sections V and X herein.

SECTION V

ENVIRONMENTAL EFFECTS OF THE PROPOSED PROGRAM

SECTION V
ENVIRONMENTAL EFFECTS OF THE PROPOSED PROGRAM

This section describes the potential environmental impacts of the Program as proposed herein. Some of these potential environmental impacts were previously addressed in the document Buena Vista Water Storage District Initial Study for the Buena Vista Water Management Program (June 2009), a copy of which is included in Appendix F; however, said impacts of the Program are also included herein to provide a comprehensive discussion of the Program's potential impacts on the environment.

Any potential environmental impacts that may result from construction of facilities or other actions performed by Program participants in association with their participation in the Program are beyond the scope of this document. Said potential environmental impacts, if any, will be addressed by Program participants, in compliance with CEQA, in separate environmental analyses.

The WEP and CEWAMP components of the Program do not include construction of any facilities by the District. Both the GRRP and the BGRP components of the Program include facilities proposed for construction. Environmental impacts that may result from implementation of the GRRP and BGRP are discussed herein, and will be avoided or reduced to levels less than significant by mitigation measures set forth in this section and in Section X.

If HEI becomes a participant in the BGRP, then environmental impacts resulting from construction and operation of BGRP facilities that are not related to HEI's participation will be addressed and mitigated as set forth herein. Environmental impacts resulting from construction and operation of BGRP facilities intended to serve the HECA power plant will additionally be subject to the environmental analysis being prepared for the HECA power plant project by the California Energy Commission (CEC), lead agency for the HECA power plant project.

A preliminary assessment of environmental impacts of BGRP facilities related to HEI's participation, and mitigation proposed to avoid or reduce said impacts to levels less than significant, are set forth in the document titled, Revised Application for Certification for Hydrogen Energy California, Kern County, California, Volumes I and II (May 2009), herein HECA AFC, which was prepared by URS for the HECA power plant project. The HECA AFC is incorporated herein by reference and is available for review on the California Energy Commission website (www.energy.ca.gov/sitingcases/hydrogen_energy/index.html).

A. AESTHETICS

Visual resources within the Buttonwillow Service Area consist largely of lands used for agriculture which possess characteristics typical of agricultural land within the Central Valley; therefore, the Program does not have the potential to impact any unique visual resources. For this reason, and those described below, the Program will not result in adverse impacts upon aesthetics.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Facilities proposed pursuant to the GRRP consist primarily of belowground features (wells and pipelines), while aboveground features of said facilities (well pumping units and appurtenances) are relatively small and unobtrusive. GRRP facilities will be constructed and operated as needed; therefore, locations for said facilities have not yet been determined. Because the Buttonwillow Service Area is comprised mostly of agricultural land, with approximately 96% holding a Farmland designation (see *Agriculture Resources* below), BVWSD intends to construct these facilities on land that is currently, or has been recently, used for agriculture or has been otherwise disturbed. For the reasons listed above, implementation of the GRRP will not result in adverse impacts upon aesthetics.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of any facilities, nor does it include any features or activities that would modify existing visual resources; therefore, implementation of the WEP will not result in adverse impacts upon aesthetics.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of any facilities, nor does it include any other features or activities that would modify existing visual resources; therefore, implementation of the CEWAMP will not result in adverse impacts upon aesthetics.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Facilities proposed pursuant to the BGRP consist primarily of belowground features (wells and pipelines), while aboveground features of said facilities (well pumping units and appurtenances) are relatively small and unobtrusive. Target Area A wells, Target Area B wells, and associated pipelines, appurtenances, and access features proposed pursuant to the BGRP will be constructed on agricultural or other previously disturbed land. In the event that HEI participates in the BGRP, the proposed HECA pipeline is preliminarily located in the District's existing unpaved service road located along the eastern bank of the West Side Canal, as shown in Figure 10. Therefore, implementation of the BGRP will not result in adverse impacts upon aesthetics.

Summary

The WEP and CEWAMP do not include construction of facilities, nor do they include any features or facilities that would impact visual resources. Facilities constructed pursuant to the GRRP and BGRP, with the exception of the aboveground portions of well pumping plants and associated appurtenances and access features, are belowground facilities. Said facilities do not include features that would substantially degrade the existing visual character or visual quality of the site or area or that would substantially damage any scenic resources. Additionally, because facilities proposed pursuant to the Program will be located on land with aesthetic properties substantially similar to those of agricultural land typical throughout the Central Valley, no unique visual resources will be impacted by implementation of the Program. For these reasons, implementation of the Program will not result in adverse impacts upon visual resources or aesthetics, and mitigation measures are not needed.

B. AGRICULTURE RESOURCES

Land use within the District's Service Area is primarily agricultural, with approximately 96% of land area within the Buttonwillow Service Area, and 92% of land area within the Maples Service Area, designated as one of several Farmland designations by the Farmland Mapping and Monitoring Program of the Division of Land Resource Protection, California Department of Conservation. Farmland designations are included in the land use designations pursuant to the Farmland Mapping and Monitoring Program and are defined below.

Prime Farmland - Prime Farmland is land which has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. Prime Farmland does not include publicly owned lands for which there is an adopted policy preventing agricultural use. Additionally, to be designated as Prime Farmland, land must meet specific criteria pertaining to water, soil temperature range, pH, water table depth, soil sodium content, flooding, erodibility, permeability, rock fragment content, and rooting depth.

Farmland of Statewide Importance - Farmland of Statewide Importance is land other than Prime Farmland which has a good combination of physical and chemical characteristics for the production of crops and has been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use. Farmland of Statewide Importance must meet specific criteria pertaining to water, soil temperature range, pH, water table depth, soil sodium content, flooding, erodibility, and rock fragment content.

Unique Farmland - Unique Farmland is land which does not meet the criteria for Prime Farmland or Farmland of Statewide Importance and has been used for the production of specific high economic value crops at some time during the two update cycles prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high-quality and/or high yields of a specific crop when treated and managed according to current farming methods. Examples of such crops may include oranges, olives, avocados, rice, grapes, and cut flowers. It does not include publicly owned lands for which there is an adopted

policy preventing agricultural use. High-value crops are listed in California Agriculture, an annual report of the California Department of Food and Agriculture. In order for land to be classified Unique Farmland, the crop grown on the land must have qualified for the list at some time during the two update cycles prior to the mapping date.

Grazing Land - Grazing Land is defined in California Government Code §65570(b)(3) as: "…land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock." The minimum mapping unit for Grazing Land is 40 Acres. Grazing Land does not include land previously designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. It also does not include heavily brushed, timbered, excessively steep, or rocky lands which restrict the access and movement of livestock.

Confined Animal Agriculture Land - Confined Animal Agriculture Lands include poultry facilities, feedlots, dairy facilities, and fish farms.

Semi-Agricultural and Rural Commercial Land - Semi-Agricultural and Rural Commercial Land includes farmsteads, agricultural storage and packing sheds, unpaved parking areas, composting facilities, equine facilities, firewood lots, and campgrounds.

Non-Agricultural and Natural Vegetation Land - Non-Agricultural and Natural Vegetation Land includes heavily wooded, rocky, or barren areas; riparian and wetland areas; grassland areas which do not qualify for grazing land due to their size or land management restrictions; small water bodies; and recreational water ski lakes. Constructed wetlands are also included in this category.

Vacant or Disturbed Land - Vacant or Disturbed Land includes open field areas that do not qualify for an agricultural category, such as mineral and oil extraction areas, off-road vehicle areas, electrical substations, channelized canals, and rural freeway interchanges.

Rural Residential Land - Rural Residential Land includes residential areas of one to five structures per ten acres.

Urban and Built-Up Land - Urban and Built-Up Land is used for residential, industrial, commercial, construction, institutional, public administrative purposes, railroad yards, cemeteries, airports, golf

courses, sanitary landfills, sewage treatment plants, water control structures, and other development purposes. Highways, railroads, and other transportation facilities are classified as part of Urban and Built-Up Land if they are a part of the surrounding urban areas. Urban and Built-Up Land does not include strip mines, borrow pits, gravel pits, farmsteads, ranch headquarters, commercial feedlots, greenhouses, poultry facilities, or road systems for freeway interchanges outside of areas classified as Urban and Built-Up Land Areas. Within areas classified as Urban and Built-Up Land, vacant and non-agricultural land which is surrounded on all sides by urban development and is less than 40 acres in size will be mapped as Urban and Built-Up Land. Vacant and non-agricultural land larger than 40 acres in size will be mapped as Other Land.

Water - Water consists of perennial water bodies with an extent of at least 40 acres.

Designations within the District's Service Area are based upon the Rural Land Mapping Edition Kern County Important Farmland 2006 maps published in November 2008 by the Farmland Mapping and Monitoring Program. Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Grazing Land, and Confined Animal Agriculture Land are herein collectively referred to as Farmland.

As stated above, approximately 96% of land within the Buttonwillow Service Area and approximately 92% of land within the Maples Service Area is classified as some type of Farmland pursuant to the Farmland Mapping and Monitoring Program. Approximately 80% of the land area within the Buttonwillow Service Area is classified as Prime Farmland, and approximately 41% of the land area within the Maples Service Area is classified as Prime Farmland.

Potential impacts upon agricultural resources and Farmland are discussed below for each component of the Program.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The locations of facilities pursuant to the GRRP have not yet been selected; however, they will be located on Farmland or on land that has been otherwise previously disturbed. The aboveground portions of these wells have a relatively small footprint, with a typical well pumping plant site comprising an area of approximately 100 feet by 100 feet. An area of approximately 100 feet by 150 feet is estimated to be disturbed during construction of each

well; however, this disturbance is temporary.

If all seventeen wells are constructed on Farmland, a total area of approximately six acres of Farmland would be temporarily disturbed during well construction and development, of which approximately 3.9 acres would be permanently disturbed and, if Farmland, would be converted to non-agricultural use.

Conversion of 3.9 acres of Farmland constitutes 0.011% of the 36,600 acres of Prime Farmland within the Buttonwillow Service Area, and constitutes approximately 0.0089% of the 44,000 acres of total Farmland within the Buttonwillow Service Area. The conversion of this relatively small area of Farmland to non-agricultural use will not result in a significant impact upon agricultural resources; therefore, mitigation measures to avoid or reduce impacts upon agricultural resources to a level less than significant are not needed.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include the construction of any facilities, nor does it include any features or activities that could result in the conversion of Farmland to non-agricultural use or in any other significant impact upon agricultural resources; therefore, mitigation measures to avoid or reduce impacts upon agricultural resources to a level less than significant are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include the construction of any facilities, nor does it include any features or activities that could result in the conversion of Farmland to non-agricultural use or in any other significant impact upon agricultural resources. As stated in the Program Initial Study (copy included in Appendix F), the CEWAMP will not convert Farmland to non-agricultural use, but will acquire and manage water service rights for Farmland that has been encumbered by conservation easements, thus reducing or eliminating agricultural use on said Farmland. For these reasons, the CEWAMP will not impact agricultural resources,

and mitigation measures to avoid or reduce impacts upon agricultural resources to a level less than significant are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

The precise sites of the Target Area A wells have not yet been determined; however, they are proposed for construction on existing Farmland or other previously disturbed land within the northern portion of the Buttonwillow Service Area. Each well site is anticipated to temporarily disturb an area of approximately 100 feet by 150 feet and to permanently disturb an area of approximately 100 feet by 100 feet.

With up to 40 Target Area A wells proposed for development, the area that can be expected to be temporarily disturbed, if all 40 wells are constructed, is approximately fourteen acres, of which approximately 9.2 acres will be permanently disturbed and, if Farmland, converted to non-agricultural use. Therefore, Target Area A wells are expected to convert up to approximately 9.2 acres of Farmland to non-agricultural use.

The precise locations of the Target Area B wells have not yet been determined; however, five of the ten proposed Target Area B wells are preliminarily located on land classified as Prime Farmland. Each well site is expected to temporarily disturb an area of approximately 100 feet by 150 feet during construction and development, and to permanently disturb an area of approximately 100 feet by 100 feet; therefore, Target Area B wells are anticipated to result in the conversion of an area of approximately 2.3 acres of Prime Farmland to non-agricultural use if all ten Target Area B wells are constructed.

The HECA pipeline proposed to convey brackish groundwater from the Target Area B wells to the HECA power plant, if HEI participates in the BGRP, consists of an approximately 20-inch diameter belowground pipeline extending approximately fifteen miles from five of the proposed Target Area B wells (refer to Figure 10) to the proposed HECA power plant, which is preliminarily located within Section 10, Township 30 South, Range 24 East. The proposed HECA pipeline site is located primarily within BVWSD's unpaved access road that runs along the eastern bank of the West Side Canal. The site of the proposed HECA pipeline includes a 50-foot wide construction right-of-way and a 25-foot wide permanent right-of-way along the pipeline alignment. Some small areas of

adjacent Farmland may be temporarily disturbed during construction; however, no Farmland will be permanently affected by construction and operation of the HECA pipeline.

Total Farmland anticipated to be converted to non-agricultural use as a result of implementation of the BGRP comprises approximately 11.5 acres, which constitutes approximately 0.031% of the 36,600 acres of Prime Farmland and approximately 0.026% of the 44,000 acres of total Farmland within the Buttonwillow Service Area. The conversion of these areas of Farmland to non-agricultural use will not adversely impact agricultural resources, and mitigation measures to avoid or reduce impacts upon agricultural resources to a level less than significant are not needed.

Summary

The combined land area anticipated to be temporarily disturbed by components of the Program that involve construction of facilities, as described above, totals approximately 65 acres, of which approximately 15.4 acres consist of Farmland that is expected to be permanently disturbed and converted to non-agricultural use. These 15.4 acres represent approximately 0.042% of the approximately 36,600 acres of Prime Farmland and approximately 0.035% of the approximately 44,000 acres of total Farmland within the Buttonwillow Service Area. The conversion of this small area of Farmland will not result in significant adverse impacts upon agricultural resources or Farmland in the Buttonwillow Service Area, the San Joaquin Valley, or the State of California; therefore, mitigation measures to avoid or reduce impacts upon agricultural resources to a level less than significant are not needed.

C. AIR QUALITY AND CLIMATE CHANGE

The District's Service Area is located within the San Joaquin Valley Air Basin, which is under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). SJVAPCD's emission inventory, which is derived from inventory methodologies obtained from the California Air Resources Board (CARB), is an itemized list of pollutants in a given area for a specified period of time. In referring to sources of emissions, SJVAPCD categorizes them as stationary (area and point) sources and mobile (on-road and off-road) sources.

Stationary sources are widely distributed and generate various low-level emissions. Examples of such sources include residential water heaters, painting operations, lawn mowers, agricultural field operations, landfills, and consumer products such as hairspray and barbecue lighter fluid.

Mobile sources include motor vehicles, including tailpipe and evaporative emissions, and are classified as either on-road or off-road. On-road sources are considered to generate a combination of emissions from automobiles, trucks, and indirect sources. Indirect sources may not emit air pollutants, but indirectly cause the generation of air pollutants by attracting vehicle trips or by consuming energy. Off-road sources include aircraft, ships, trains, and self-propelled construction equipment.

Regulated air pollutant emissions include carbon monoxide (CO), oxides of nitrogen (NO_x), sulfur oxides (SO_x), reactive organic compounds (ROC), and particulate matter that includes particles ten microns or less in diameter (PM_{10}) and particles 2.5 microns or less in diameter ($PM_{2.5}$). The SJVAPCD region is designated *nonattainment* for ozone (federal and state standards), for $PM_{2.5}$ (federal and state standards), and for PM_{10} (under state standards). The SJVAPCD region has been designated *attainment* for PM_{10} under federal standards. For all other criteria pollutants (i.e. CO, NO_x, and SO_x), the Program area is designated *attainment*.

In addition to addressing regulated air pollutant emissions that may result in environmental impacts, air quality analyses must also address greenhouse gas (GHG) emissions that may result in environmental impacts or that may contribute to climate change. Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006, mandates the reduction of GHG emissions in California to 1990 levels by the year 2020. Senate Bill 97 (SB 97), enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. SB 97 directs the Governor's Office of Planning and Research (OPR) to develop draft CEQA Guidelines "for the mitigation of greenhouse gas emissions."

State law defines GHGs to include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (California Health and Safety Code Section 38505 (g)). The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide, respectively.

Currently, there are no established significance thresholds for GHGs in SJVAPCD, or in California. The document South Coast Air Quality Management District Draft Guidance Document - Interim CEQA Greenhouse Gas (GHG) Significance Threshold (SCAQMD, October 2008) includes a summary and discussion of various methods that have been used or proposed by other agencies for the purpose of determining the significance of GHG emissions. One method cited in said document and termed Threshold Number 2.3, "is based on CARB's proposed mandatory reporting threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2Eq) per year. Alternatively, use the Market Advisory Committee [threshold] of 10,000 metric tons of CO_2Eq/year. Projects less than either would not be significant." For the purposes of this analysis, GHG emissions less than 25,000 metric tons of CO_2Eq/year will be considered less than significant.

CO_2Eq is defined by the United States Environmental Protection Agency (USEPA) as, "A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP)…The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP." The GWPs for carbon dioxide, methane, and nitrous oxide are 1, 21, and 310, respectively.

In addition to regulated emissions, the Program will result in direct and indirect emissions of the greenhouse gases carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), as byproducts of combustion of natural gas and diesel fuel in groundwater production, construction equipment and construction worker commute trips, and gasoline combustion from vehicle travel related to operation and maintenance of the groundwater well pumps and associated pipelines and appurtenances. Additionally, the increased demand for electrical energy to serve the Program may result in an increase of CO_2 emissions from the generation of electricity (referred to as indirect emissions, as they are not directly emitted by the Project).

There are a total of approximately 200 well pumping plants within the Buttonwillow Service Area, of which it is estimated that ten are powered by diesel fuel and one is powered by natural gas. Of the 200 wells, seven are electric-powered wells owned and operated by BVWSD. The remaining wells are owned by landowners and are used for domestic and farming operations throughout the District. The emissions from these sources are widespread, which categorizes them as Area Sources. Emissions generated by diesel fuel and natural gas powered pumping plants are considered direct source emissions, while emissions generated by electric powered

pumping plants are considered indirect source emissions since the emissions are generated off-site by the energy providers for the area.

Mobile source emissions generated by the Program consist of on-road emissions from daily vehicle travel for routine check-ups and maintenance of Program facilities, and off-road emissions from construction activities needed to construct facilities pursuant to the Program.

Direct Stationary Combustion Sources - The method used to estimate CO_2Eq emissions for existing conditions within the District, as well as for the proposed Program, was an analysis of fuel input, as described in the United States Environmental Protection Agency (USEPA) document Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Stationary Combustion Sources (USEPA 2008). This estimate involved determining the carbon content of the fuel combusted and applying that to the amount of fuel burned to approximate CO_2 emissions. Calculations were performed for diesel fuel combustion using the following equation:

$$Emissions = \sum_{i=1}^{n} Fuel_i * HC_i * C_i * FO_i * \frac{CO_{2(m.w.)}}{C_{(m.w.)}} \qquad \text{(Equation 1)}$$

Where:	HCi	=	Heat Content of Fuel Type
	Ci	=	Carbon Content Coefficient of Fuel Type
	FOi	=	Fraction Oxidized of Fuel Type
	$CO_{2\,(m.w.)}$	=	Molecular Weight of CO_2
	$C_{(m.w.)}$	=	Molecular Weight of Carbon

Of the 200 existing well pumping facilities within the District's Service Area, eleven are not powered by electricity; ten are powered by diesel fuel; and only one is powered by natural gas. For this analysis, all eleven non-electric well pumping facilities were considered to be powered by diesel fuel. Well pumps powered by diesel fuel emit greater quantities of air pollutants than those powered by natural gas, so this conservatively assesses direct emissions. Under current operating conditions, these eleven wells potentially contribute 646 metric tons of CO_2 emissions

per year, each running at an average of 918 hours per year. The average well runtime was established from BVWSD's average monthly production data.

CH_4 and N_2O emissions depend on the fuel characteristics and the combustion technology type and were estimated using the following equation:

$$Emissions_{p,s} = A_s * EF_{p,s} \qquad \text{(Equation 2)}$$

Where:	p	=	Pollutant (CH_4 or N_2O)
	s	=	Source Category
	A	=	Activity Level
	EF	=	Emission Factor

The activity level of the direct source emissions is in terms of the fuel input in units of one million British thermal units (mmBtu). Based on the total CO_2 emissions determined using Equation 1, the total activity level for these sources is approximately 8835.75 mmBtu. The emission factors are found in the GHG Inventory Protocol in units of grams per mmBtu (g/mmBtu). Factors for CH_4 and N_2O are given as 11 g/mmBtu and 0.6 g/mmBtu, respectively.

To determine the CO_2Eq of each GHG, the Global Warming Potential (GWP) factors are applied. The GWP factors are found in Chapter 6 of the Climate Leaders Greenhouse Gas Inventory Protocol Design Principles (USEPA 2005) and are used to determine the CO_2Eq of all GHG emissions. The GWP for CO_2 is 1, for CH_4 is 21, and for N_2O is 310.

The total combined CO_2Eq of CH_4 and N_2O emitted under current operating conditions is approximately 3.64 metric tons per year. When added to the 646 metric tons of CO_2 estimated to be emitted under current operating conditions, this totals approximately 650 metric tons of CO_2Eq/year generated by direct source emissions under current operating conditions.

Indirect Stationary Combustion Sources - Indirect source emissions contributed by the existing 189 electric-powered well pumps within the District were estimated using Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Indirect Emissions from Purchases/Sales of Electricity and Steam (USEPA 2008). The typical electric-powered pump used by BVWSD has a 98 horsepower motor (0.073 megawatts), and each well operates approximately 918 hours per year, consuming 67 megawatt-hours (MWh) of electricity per year. GHG emissions based on electrical usage were determined using the following equation:

$$Emissions = EP * ERate_i \qquad \text{(Equation 3)}$$

Where: EP = Electricity Purchases (e.g., MWh)

$ERate_i$ = Gas i emission rate for electricity purchased (e.g., mass CO_2/MWh)

The emission rates ($ERate_i$) for CO_2, CH_4, and N_2O are set forth in the GHG Inventory Protocol. In California, the emission rates are 878.71 pounds CO_2/MWh, 0.366 pounds CH_4/MWh, and 0.0085 pounds N_2O/MWh.

Under current operating conditions, the 189 electric powered wells potentially produce 5 million kilograms of CO_2, 210 kilograms of CH_4, and 48 kilograms of N_2O, which combine to equal approximately 5,066 metric tons of CO_2Eq emissions per year.

Direct Mobile Source Emissions - BVWSD currently owns and operates seven wells in its Service Area. All other wells in the District's Service Area are privately owned and operated. If District maintenance personnel travel to each District-owned well once daily, this would equate to driving approximately 34 miles per day, roundtrip, for a total of 12,410 miles per year. This GHG emissions analysis was conducted using the following equation obtained from Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Optional Emissions from Commuting, Business Travel and Product Transport (USEPA 2008).

$$Emissions = VMT * (EF_{CO_2} + EF_{CH_4} * 0.021 + EF_{N_2O} * 0.310) \qquad \text{(Equation 4)}$$

Where:	VMT	=	Vehicle Miles Traveled
	EF	=	Emission Factor (kg/vehicle-mile)
	EF_{CO2}	=	0.364 kg CO_2/vehicle-mile
	EF_{CH4}	=	0.031 g CH_4/vehicle-mile
	EF_{N2O}	=	0.032 g N_2O/vehicle-mile

Under existing conditions, the estimated mobile source (on-road) emissions generated by the District within the Buttonwillow Service Area are approximately 4.6 metric tons of CO_2Eq emissions per year.

Combined, existing District combustion activities resulting from mobile sources and area sources within the Buttonwillow Service Area generate approximately 5,700 metric tons of CO_2Eq emissions per year. These emissions are summarized in Table 4 below.

Table 4 Current Operational Emissions								
Direct Emissions								
Source Type	**Quantity**	**Operation Per Year (Each)**	**Unit**	**Emissions (kg)**				**Total Metric Tons of CO_2Eq/Year**
				CO_2	**CH_4**	**N_2O**	**Total CO_2 Equivalent**	
Diesel Powered Pumps	11	918	Hours/yr	646,335	97	5	650,020	650
Vehicle Travel : 34 miles per day	1	12,410	Miles/yr	4,517	385	397	4,648	4.6
Indirect Emissions								
Source Type	**Quantity**	**Operation Per Year (Each)**	**Unit**	**Emissions (kg)**				**Total Metric Tons of CO_2Eq/Year**
				CO_2	**CH_4**	**N_2O**	**Total CO_2 Equivalent**	
Electric Pumps : 0.18 MWh per day	189	67	MWh/yr	5,047,092	210	48	5,066,423	5,066
Totals:				**5,697,944**	**692**	**451**	**5,721,091**	**5,721**

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The GRRP is expected to generate air pollutant emissions during construction, operation, and maintenance of facilities pursuant to the GRRP. Table 5 sets forth peak day construction equipment exhaust emissions for regulated pollutants, and Table 6 sets forth peak day GHG construction equipment emissions, both of which are anticipated to result from construction of facilities pursuant to the GRRP.

Table 5 Estimated Peak Day Construction Equipment Exhaust Emissions [1] for Construction of Facilities Pursuant to the GRRP								
Equipment Type and Use			**Pollutants (lbs/day)**					
Equipment Type	**Quantity**	**No. of Hours in Operation**	**CO**	**ROC**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$ [3]**
Excavator	1	8	4.5576	1.2672	9.872	0.0104	0.3048	0.2713
Drill Rigs	2	12	12.4800	2.7888	29.4888	0.0408	1.2984	1.1556
Wheeled Loader	1	8	4.1712	1.2240	9.8040	0.0096	0.5504	0.4899
Dump Truck	1	8	6.3448	2.0776	20.4040	0.0216	0.7432	0.6614
Water Truck	1	8	3.4328	0.9040	8.6496	0.0104	0.3768	0.3354
Grader	1	4	2.5712	0.7300	6.0948	0.0060	0.3184	0.2834
Subtotals			**33.5579**	**8.9916**	**84.3132**	**0.0988**	**3.592**	**3.1970**
Worker Vehicles: 10 miles per day	8	-	0.7744	0.0794	0.0804	0.0085	0.0068	0.0061
Excavation Material Hauling: 150 miles per day	1 Truck		3.0241	0.4183	3.3549	0.0402	0.1208	0.1075
Additional PM_{10} for Fugitive Dust							40	8.4000
TOTAL EMISSIONS			**36.6594**	**9.4893**	**87.7485**	**0.1475**	**43.4453**	**11.7106**
Construction Threshold (lbs/day) [2]			550	75	100	150	150	55
Exceed Daily Threshold? (Yes/No)			NO	NO	NO	NO	NO	NO

[1] Off-road mobile equipment emissions are based on Off-Road Mobile Source Emission Factors (Scenario Years 2007-2025) provided by South Coast Air Quality Management District (SCAQMD) on their website http://www.aqmd.gov/ceqa/handbook/offroad/offorad.html, last updated April 24, 2008. On-road vehicle emissions are based on On-Road Vehicles (Scenario Years 2007-2026) emission factors provided by SCAQMD on their website http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html, last updated April 24, 2008.

[2] Peak daily construction significance thresholds for air pollutant emissions are established by SCAQMD and are set forth in the South Coast Air Quality Management District CEQA Air Quality Handbook (1993). These thresholds, and the factors cited in [1] above, are based on methodologies developed by CARB and were used in the absence of established thresholds and factors for the SJVAPCD.

[3] Pursuant to the SCAQMD document South Coast Air Quality Management District Final-Methodology to Calculate Particulate Matter $(PM)_{2.5}$ and $PM_{2.5}$ Significance Thresholds (October 2006), fugitive PM emissions are estimated to be comprised of 21% $PM_{2.5}$, while off-road combustion PM is estimated to contain 89% $PM_{2.5}$. Based on this, $PM_{2.5}$ emissions are estimated to be approximately 11.7 pounds per day on a typical peak day.

Table 6 Estimated Peak Day Construction Equipment Exhaust Greenhouse Gas Emissions for Construction of Facilities Pursuant to the GRRP							
Equipment Type and Use			**Emissions (kg/day)**				**(Metric Tons/day)**
Equipment Type	**Quantity**	**No. of Hours in Operation**	**CO_2**	**CH_4**	**N_2O**	**Total CO_2 Equivalent**	**Total CO_2 Equivalent**
Excavator	1	8	960.00	0.1144	0.0000	962.40	0.96
Drill Rigs	2	12	3,960.00	0.2520	0.0000	3,965.29	3.97
Wheeled Loader	1	8	872.00	0.1104	0.0000	874.32	0.87
Dump Truck	1	8	2,080.00	0.1872	0.0000	2,083.93	2.08
Water Truck	1	8	984.00	0.0816	0.0000	985.71	0.99
Grader	1	4	532.00	0.0660	0.0000	533.39	0.53
Subtotals			**9,388.00**	**0.8116**	**0.0000**	**9,405.04**	**9.41**
Worker Vehicles: 10 miles per day	8		41.52	0.0029	0.0038	42.75	0.04
Excavation Material Hauling: 150 miles per day	1 Truck		258.90	0.0032	0.0026	258.90	0.26
Total Emissions			**9,688.42**	**0.8176**	**0.0063**	**9,706.69**	**9.71**

As shown on Table 6, maximum daily GHG emissions during construction are estimated to be 9.71 metric tons CO_2Eq/day, which would equate to approximately 2,565 metric tons CO_2Eq/year if construction were carried out for 264 days/year (22 working days per month for twelve months); however, actual annual construction GHG emissions would theoretically be less due to holiday schedules and the fact that construction is not likely to take place continuously throughout the year. Air pollutant emissions generated during construction of facilities pursuant to the GRRP will not result in a significant impact upon air quality or climate change, based upon established thresholds for regulated air pollutant emissions and proposed GHG reporting thresholds described herein.

The GRRP includes recharging groundwater into the aquifer for later recovery, which involves an increase in groundwater pumping over current conditions. In addition to air pollutant emissions that are expected to be generated during construction of GRRP facilities (as shown in Tables 5 and 6), operation and maintenance of the GRRP facilities and increased use of existing wells will also generate air pollutant emissions.

Increased use of existing wells within the District is expected to equate to an additional zero to fifteen days of additional well pump runtime per year. Since each pump runs about 918 hours per year, it is estimated that each well operates for an average of three hours per day, if the wells operate every day. Because the GRRP includes the construction and operation of up to seventeen additional wells, all seventeen additional wells are included in this analysis and are considered electric-powered wells.

Table 7 lists the total estimated GHG emissions for direct, indirect, and mobile sources expected to result with implementation of the GRRP, which have been calculated using the formulas and methods described above.

Table 7
Estimated Additional Operational GHG Emissions (GRRP)

Source Type	Quantity	Additional Operation Per Year (Each Well)	Unit	Emissions (kg)				Total Metric Tons of CO_2Eq/Year
				CO_2	CH_4	N_2O	Total CO_2Eq	
Direct Emissions								
Diesel Powered Pumps: 3 hours per day	11	45	Hours/yr	31,683	5	0.26	31,683	32
Vehicle Travel: 34 miles per day	1	510	Miles/yr	186	16	16	191	0.191
Indirect Emissions								
Electric Pumps: 0.18 MWh per day	189	3	MWh/yr	225,989	9	2	226,855	227
Additional Electric Pumps: 0.18 MWh per day	17	67	MWh/yr	453,971	19	4.33	455,710	456
Totals:				**711,829**	**49**	**23**	**714,439**	**715**

The eleven diesel fuel well pumping plants operating for an additional fifteen days per year, at three hours per day, will contribute up to 32 additional metric tons of CO_2Eq

emissions per year, which equates to approximately a 5% increase in total direct CO_2Eq emissions over existing CO_2Eq emissions.

The 189 electric powered well pumping plants operating for an additional fifteen days per year, at three hours per day, will contribute up to 227 additional metric tons of CO_2Eq emissions per year, a 0.5% increase in total indirect CO_2Eq emissions. Emissions expected to be generated by the seventeen proposed GRRP wells were determined using Equation 3, and will contribute up to 456 metric tons of indirect CO_2Eq emissions per year.

The estimated fifteen additional days per year of existing well plant operation will theoretically increase the maintenance frequency proportionately. Fifteen additional days of field equipment monitoring and maintenance would increase the number of miles driven per year for maintenance operations by approximately 510 miles, which will contribute up to 0.191 metric tons per year of CO_2Eq emissions.

Based on the GHG emissions reporting threshold proposed by CARB (25,000 metric tons CO_2Eq/year), the total estimated long-term annual GHG emissions of 795 metric tons CO_2Eq/year generated by the GRRP would be less than significant. Therefore, implementation of the GRRP will not result in a significant impact on air quality or climate change, and mitigation measures to avoid or reduce adverse impacts upon air quality to a level less than significant are not needed.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities, nor does it include any features or activities (e.g., vehicle trips for maintenance) that would generate air pollutant emissions; therefore, mitigation measures to avoid, or reduce to a level less than significant, adverse impacts upon air quality are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities, nor does it include any features or activities (e.g., vehicle trips for maintenance) that would generate air pollutant emissions; therefore, mitigation measures to avoid, or reduce to a level less than significant, adverse impacts upon air quality are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Air pollutant emissions generated by implementation of the BGRP consist of those resulting from construction, operation, and maintenance of facilities proposed pursuant to the BGRP.

Table 8 sets forth the peak day construction equipment exhaust emissions (regulated emissions) estimated to be generated during construction of facilities proposed pursuant to the BGRP. Table 9 sets forth the peak day GHG emissions estimated to be generated during construction of facilities proposed pursuant to the BGRP. These estimates have been calculated using the formulas and methods described above.

Regulated air pollutant emissions generated during construction are temporary and remain below the established peak daily thresholds (see Table 8). As shown in Table 9, maximum GHG emissions are estimated to be 9.46 metric tons CO_2Eq/day during construction, which equates to approximately 2,497 metric tons CO_2Eq/year if construction is carried out 264 days/year (22 working days per month for twelve months); therefore, actual annual construction GHG emissions would theoretically be less and remain well below proposed reporting thresholds, due to holiday schedules and the fact that construction is not likely to take place continuously throughout the year.

For the reasons stated above, air pollutant emissions generated during construction of facilities pursuant to the BGRP will not result in a significant impact upon air quality or climate change, based upon established thresholds for regulated air pollutant emissions and proposed GHG thresholds described herein.

Table 8 Estimated Peak Day Construction Equipment Exhaust Emissions [1] for Construction of Facilities Pursuant to the BGRP								
Equipment Type and Use			**Pollutants (lbs/day)**					
Equipment Type	**Quantity**	**No. of Hours in Operation**	**CO**	**ROC**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$ [3]**
Trencher	1	8	3.9936	1.4096	6.3280	0.0056	0.5304	0.4721
Drill Rigs	2	12	12.4800	2.7888	29.4888	0.0408	1.2984	1.1556
Wheeled Loader	1	8	4.1712	1.2240	9.8040	0.0096	0.5504	0.4899
Dump Truck	1	8	6.3448	2.0776	20.4040	0.0216	0.7432	0.6614
Water Truck	1	8	3.4328	0.9040	8.6496	0.0104	0.3768	0.3354
Compactor	1	8	0.2104	0.2104	0.2568	0.0048	0.3280	0.2919
Roller	1	8	3.4176	1.0000	6.5328	0.0064	0.4592	0.4087
Subtotals			**34.0504**	**9.6144**	**81.4640**	**0.0992**	**4.2864**	**3.8150**
Worker Vehicles: 30 miles per day	10	-	2.9056	0.2977	0.3015	0.0032	0.0258	0.0230
Material Hauling: 200 miles per day	1 Truck		4.0321	0.5577	4.4732	0.0536	0.1610	0.1433
Additional PM_{10} for Fugitive Dust							40	8.4000
TOTAL EMISSIONS			**40.9881**	**10.4698**	**86.2387**	**0.1560**	**44.4732**	**12.3813**
Construction Threshold (lbs/day) [2]			550	75	100	150	150	55
Exceed Daily Threshold? (Yes/No)			NO	NO	NO	NO	NO	NO

(1) Off-road mobile equipment emissions are based on Off-Road Mobile Source Emission Factors (Scenario Years 2007-2025) provided by South Coast Air Quality Management District (SCAQMD) on their website http://www.aqmd.gov/ceqa/handbook/offroad/offorad.html, last updated April 24, 2008. On-road vehicle emissions are based on On-Road Vehicles (Scenario Years 2007-2026) emission factors provided by SCAQMD on their website http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html, last updated April 24, 2008.

(2) Peak daily construction significance thresholds for air pollutant emissions are established by SCAQMD and are set forth in the South Coast Air Quality Management District CEQA Air Quality Handbook (1993). These thresholds, and the factors cited in (1) above, are based on methodologies developed by CARB and were used in the absence of established thresholds and factors for the SJVAPCD.

(3) Pursuant to the SCAQMD document South Coast Air Quality Management District Final-Methodology to Calculate Particulate Matter $(PM)_{2.5}$ and $PM_{2.5}$ Significance Thresholds (October 2006), fugitive PM emissions are estimated to be comprised of 21% $PM_{2.5}$, while off-road combustion PM is estimated to contain 89% $PM_{2.5}$. Based on this, $PM_{2.5}$ emissions are estimated to be approximately 12.4 pounds per day on a typical peak day.

Table 9 Estimated Peak Day Construction Equipment Exhaust Greenhouse Gas Emissions for Construction of Facilities Pursuant to the BGRP							
Equipment Type and Use			**Emissions (kg/day)**				**(Metric Tons/day)**
Equipment Type	Quantity	No. of Hours in Operation	CO_2	CH_4	N_2O	Total CO_2 Equivalent	Total CO_2 Equivalent
Trencher	1	8	469.60	0.1272	0.0000	472.27	0.47
Drill Rigs	2	12	3,960.00	0.2520	0.0000	3,965.29	3.97
Wheeled Loader	1	8	872.00	0.1104	0.0000	874.32	0.87
Dump Truck	1	8	2,080.00	0.1872	0.0000	2,083.93	2.08
Water Truck	1	8	984.00	0.0816	0.0000	985.71	0.99
Compactor	1	8	34.40	0.0040	0.0000	34.48	0.03
Roller	1	8	536.80	0.0904	0.0000	538.70	0.54
Subtotals			**8,936.80**	**0.8528**	**0.0000**	**8,954.71**	**8.95**
Worker Vehicles: 30 miles per day	10		155.70	0.0108	0.0141	160.30	0.16
Excavation Material Hauling: 200 miles per day	1 Truck		345.20	0.0042	0.0034	345.20	0.35
Total Emissions			**9,437.70**	**0.8678**	**0.0175**	**9,460.21**	**9.46**

GHG emissions estimated to be generated during operation of the BGRP include those resulting from the generation of electricity required for operation of the Target Area A wells (up to 40) and Target Area B wells (up to ten). Said estimated indirect GHG emissions are set forth in Table 10 and consist of approximately 12,035 metric tons CO_2Eq/year, which is considered to be less than significant, according to the GHG emission reporting threshold of 25,000 metric tons CO_2Eq/year proposed by CARB.

Table 10 Estimated Operational Greenhouse Gas Emissions for BGRP								
Indirect Emissions								
Source Type	**Quantity**	**Additional Operation Per Year (Each)**	**Unit**	**Emissions (kg)**				**Total Metric Tons of CO_2Eq/ Year**
				CO_2	**CH_4**	**N_2O**	**Total CO_2Eq**	
Target Area A Wells Electric Pumps: 1.75 MWh per day	40	640	MWh	10,203,392	425	97.28	10,242,473	10,242
Target Area B Wells Electric Pumps (7 operational, 2 redundant): 0.18 MWh per day	7	640	MWh	1,785,594	74	17.02	1,792,433	1,792
Totals:				**11,988,986**	**499**	**114.3**	**12,034,906**	**12,035**

Maintenance activities included in implementing the BGRP will generate minor quantities of air pollutant emissions resulting from daily vehicle trips to the Target Area A wells, Target Area B wells, and associated pipelines and appurtenances. Maintenance travel for five of the ten proposed Target Area B wells (as shown in Figure 10) will be minimized, however, by combining all maintenance visits to these five wells into one daily vehicle trip, due to the close proximately of the five wells.

Because the specific locations of a majority of the wells proposed pursuant to the BGRP have not yet been selected, estimated quantities of GHG emissions that may be generated during maintenance activities for the BGRP cannot be determined at this time. It is presumed, however, that maintenance activities performed during implementation of the BGRP will not result in significant adverse impacts upon air quality.

Summary

The WEP and CEWAMP do not include construction of any facilities, nor do they include any features or activities that would impact air quality or climate change.

The GRRP and BGRP include construction, operation, and maintenance activities that will generate air pollutant emissions, including GHG emissions. As shown in Tables 4 and 7 herein, quantities of regulated air pollutant emissions estimated to be generated during construction of facilities pursuant to the GRRP and BGRP remain below established daily thresholds for construction and thus will not result in a significant impact upon air quality.

Maximum annual GHG emissions estimated to be generated during construction of facilities proposed pursuant to both the GRRP and BGRP, conservatively assuming that construction of said facilities would occur simultaneously for 264 days per year, are approximately 5,065 metric tons CO_2Eq/year, which is substantially less than the proposed reporting threshold of 25,000 metric tons of CO_2Eq/year. Therefore, GHG emissions resulting from construction pursuant to the Program would be less than significant.

Increased GHG emissions estimated to occur during operation and maintenance activities pursuant to the GRRP (715 metric tons CO_2Eq/year) and BGRP (12,035 metric tons CO_2Eq/year) total 12,750 metric tons CO_2Eq/year. When combined with GHGs emitted by existing District operations (approximately 5,721 metric tons CO_2Eq/year), the total GHGs that would be emitted during implementation of the Program consist of approximately 18,471 metric tons CO_2Eq/year, which is below CARB's proposed reporting threshold of 25,000 metric tons CO_2Eq/year. Therefore, GHG emissions generated during ongoing operation and maintenance of the Program, combined with the District's existing operational GHG emissions, are not anticipated to result in a significant impact upon air quality or climate change.

For the reasons discussed above, Program impacts upon air quality and upon climate change are less than significant, and mitigation measures to avoid or reduce potential impacts upon air quality and climate change are not needed.

D. BIOLOGICAL RESOURCES

As stated in *Agriculture Resources* above, the majority of land area within the Buttonwillow Service Area is designated Farmland (approximately 96%) pursuant to the State Farmland Mapping and Monitoring Program. Because agricultural land is typically highly disturbed, it generally does not provide good-quality habitat. Potential environmental impacts that may result from implementation of the Program are discussed below for each component.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The locations of facilities pursuant to the GRRP have not yet been determined; however, the District intends to construct said facilities on existing Farmland or on other previously disturbed land.

As stated above, active agricultural land is typically highly disturbed and does not provide good-quality habitat for sensitive species. Environmental sensitivity will be considered in selecting each GRRP well site. Mitigation measures set forth herein are intended to avoid or reduce to a level less than significant any adverse impacts on biological resources that may result from implementation of the GRRP. See *Mitigation Measures* below.

Additionally, as each GRRP well site is selected, a biological resources assessment will be performed at the site prior to construction to confirm the effectiveness of the mitigation. Additional site-specific mitigation will be incorporated into the GRRP, if necessary, in order to avoid or reduce to a level less than significant potential impacts upon biological resources.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of any facilities, nor does it include any features or activities that would harm biological resources. Water that would be exchanged as part of the WEP consists of surplus water that is above and beyond the quantities normally available to biological resources; therefore, the WEP will not subject any biological resources to a water deficit. For these reasons, the WEP will not result in adverse impacts upon biological resources.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of any facilities, nor does it include any features or activities that would impact biological resources. Water supplies resulting from implementation of the CEWAMP include water that is not otherwise intended for use in habitat restoration efforts. Acquisition and management of water service rights pursuant to the CEWAMP will comply with any applicable conservation easements. Therefore, the CEWAMP will not result in adverse impacts upon biological resources.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Precise locations of the Target Area A wells and appurtenant facilities have not yet been determined; however, they will be constructed within the northern portion of the Buttonwillow Service Area on lands that are currently, or have been recently, used for agriculture or have been otherwise previously disturbed. Target Area A wells will be arranged in a grid-array formation, and the locations, spacing, and depths will be determined during well field design, installation, and testing.

Target Area A wells will not be sited in a manner that would impact wetlands, riparian habitat, or other sensitive natural communities. Mitigation measures set forth herein are intended to avoid or mitigate any adverse impacts upon biological resources that may result from implementation of the BGRP in Target Area A.

As each Target Area A well site is selected, a biological resources assessment will be performed at the site prior to construction to confirm the effectiveness of the mitigation. Additional site-specific mitigation will be incorporated into the BGRP in Target Area A, if necessary, in order to avoid or reduce to a level less than significant potential impacts upon biological resources that may result from construction and operation of facilities pursuant to the BGRP.

The precise locations of the Target Area B wells have not yet been determined; however, five of the ten Target Area B wells are preliminarily located within Sections 34 and 35, Township 28 South, Range 22 East and Sections 1, 2, and 12, Township 29 South, Range 22 East. The conceptual design for these five wells (three operational and two redundant) includes a northwesterly trending line, with the wells spaced at nominal intervals of approximately one-quarter mile and drilled to depths of approximately 300 to 400 feet below ground surface. If HEI becomes a participant in the BGRP, then these five wells will serve the HECA power plant. The final locations, spacing, and depths of all Target Area B wells will be determined during well field design, installation, and testing.

If HEI becomes a participant in the BGRP, the proposed HECA pipeline would be included in the Project. The HECA pipeline consists of a twenty-inch diameter belowground pipeline that extends approximately fifteen miles southeasterly from the five Target Area B wells (as shown on Figure 10) to the proposed HECA power plant, which is preliminarily located in Section 10, Township 30 South, Range 24 East in the Buttonwillow Service Area. The HECA pipeline would be proposed for construction within the District's unpaved service road along the eastern bank of the West Side Canal. Preliminary locations of the five Target Area B wells and the HECA pipeline that would serve the HECA power plant if HEI participates are depicted in Figure 10.

URS performed a biological resources field survey along the proposed HECA pipeline alignment and within a 1,000-foot area offset from the alignment. URS also performed a records search in the California Natural Diversity Database (CNDDB) in March 2009 for a larger area surrounding the HECA pipeline. The results of the field survey and records search are set forth in the HECA AFC and are summarized herein as applicable to the Program in the event that HEI participates.

The entire area proposed for installation of the HECA pipeline was included in the biological resources assessment performed by URS, and a portion of the area proposed for installation of the five Target Area B wells shown on Figure 10 was included in said biological resources assessment. Although the precise locations of the Target Area B wells have not yet been determined, five of the ten Target Area B wells will be located proximate to the HECA pipeline in adjacent Farmland, if HEI participates. Areas proposed for

locating these five Target Area B wells and the HECA pipeline are both subject to significant, regular disturbance.

According to the HECA AFC, the following species either occur or potentially occur within a 1,000-foot distance from the proposed HECA pipeline:

- Kern mallow
- Lost Hills crownscale
- Hoover's eriastrum
- San Joaquin kit fox
- Tipton kangaroo rat
- Nelson's antelope squirrel
- Giant garter snake

Descriptions of each of the above species are included in the HECA AFC and are summarized below.

Kern Mallow (*Eremalche kernensis*)

Federal Status: Endangered

California Status: None

California Native Plant Society (CNPS) Status: List 1B.2

Description: Kern mallow is an annual herb that occurs primarily in Kern and Tulare Counties. A member of the *Malvaceae* family, it inhabits chenopod scrub and valley and foothill grasslands. Its habitat ranges in elevation from 70 to 1,000 meters. The blooming period is from March to May. The decline of this species is attributable to conversion of habitat to agricultural use, as well as grazing and energy development.

Lost Hills Crownscale (*Atriplex vallicola*)

Federal Status: None

California Status: None

CNPS Status: List 1B.2

Description: Lost Hills crownscale is an annual herb that occurs primarily in Fresno, Kern, and San Luis Obispo Counties. A member of the *Chenopodiaceae* family, it inhabits chenopod scrub, valley and foothill grasslands, and vernal pools. Its habitat ranges in elevation from 50 to 635 meters, and it blooms from April to August. The decline of this species is attributable to grazing, agricultural conversion, and energy development.

Hoover's Eriastrum *(Eriastrum hooveri)*

Federal Status: Delisted

California Status: None

CNPS Status: List 4.2

Description: Hoover's eriastrum star is an annual herb that occurs primarily in Fresno, Kern, and Tulare Counties. Previously listed as threatened by USFWS, Hoover's eriastrum was delisted October 2003 (CDFG). A member of the *Brassicaceae* family, it inhabits chenopod scrub, pinyon and juniper woodlands, and valley and foothill grasslands. Its habitat ranges in elevation from 50 to 915 meters, and its blooming period is from February to May. The decline of this species is attributable to agriculture, urbanization, energy development, grazing, and possibly competition with non-native plants.

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

Federal Status: Endangered

California Status: Threatened

Description: The San Joaquin kit fox historically ranged throughout the San Joaquin Valley from Contra Costa County to northern Santa Barbara County. San Joaquin kit foxes remain widely dispersed but have greatly reduced numbers and isolated populations (Williams and Kilburn 1992). San Joaquin kit foxes primarily live in grassland and, to a lesser extent, shrub and agricultural habitats. They predominantly eat rodents, ground squirrels, rabbits, hares, and ground-nesting birds. The pups are born in late winter and early spring, and the male provides most of the food for the female while she is nursing. Kit foxes change dens frequently, often enlarging existing round squirrel burrows to create new dens. Predation or competitive exclusion of kit foxes may occur in the presence of coyotes, introduced red foxes, domestic dogs, bobcats, and large raptors. Human threats to the San Joaquin kit fox include destruction of habitat, habitat degradation, predator and pest control programs, and accidents caused by proximity to humans such as electrocution, road-kill, and suffocation from accidental burial in dens (Williams and Kilburn 1992). Finally, natural factors such as drought, flooding, and rabies cause a significant percentage of kit fox deaths. The San Joaquin kit fox is currently listed as a federally Endangered Species and a State of California Threatened Species (USFWS 1998).

Tipton Kangaroo Rat *(Dipodomys nitratoides nitratoides)*

Federal Status: Endangered

California Status: Endangered

Description: Tipton kangaroo rats are typically found in arid vegetative communities with flat or gently sloping terrain within the floor of the Tulare Basin in the southern San Joaquin Valley. Tipton kangaroo rats generally occupy grassland with scattered shrubs and desert-shrub associations on friable soils. Burrows are commonly located in slightly elevated earth, canal embankments, and bases of shrubs and fences where mobile soils gather above the level of surrounding terrain. Soft soils generally support higher densities of Tipton kangaroo rats than other soil types (Williams and Kilburn 1992). To support a sustainable population, Tipton kangaroo rats require terrain that is not subject to flooding. Breeding occurs in the winter months with females typically giving birth to only two young.

The historical geographic range of Tipton kangaroo rats encompassed over 1.7 million acres of arid land. Their populations occupied the valley floor of the Tulare Basin throughout level or nearly level terrain. Current occurrences are restricted to scattered, isolated areas. In the southern San Joaquin Valley this includes the Kern National Wildlife Refuge, Delano, and other scattered areas within Kern County. Agricultural and residential development and the widespread use of rodenticides are principally responsible for the decline of the species (Williams and Kilburn 1992).

Nelson's Antelope Squirrel *(Ammospermophilus nelsoni)*

Federal Status: No Federal Status

California Status: California Threatened

Description: Nelson's antelope squirrels are permanent residents of the western San Joaquin Valley. Their habitat is generally composed of sandy loam soils, widely-spaced alkali scrub vegetation, and dry washes. Their diet consists of insects, vegetation, small vertebrates, and seeds. They have been known to cache seeds underground (Hawbecker 1947). Nelson's antelope squirrels dig burrows or use kangaroo rat burrows for shelter, and utilize rocks and vegetation for cover (Grinnell and Dixon 1919). Activity is diurnal, yet declines during elevated mid-day temperatures. Breeding occurs from February to May, peaking in April. Nests are constructed within burrows, which are typically located at elevations ranging from 200 to 1,200 feet above mean sea level in southern Merced County south to Kern, Kings, and Tulare Counties, as well as portions of eastern San Luis Obispo and Santa Barbara Counties. In 1979, only about 20% of the original range was occupied (CDFG 1980). The decline of this species is attributable to loss of habitat to cultivation, overgrazing, and the use of rodenticides (CDFG 1980). Badgers, kit foxes, red-tailed hawks, golden eagles, coyotes, and various snakes prey on Nelson's antelope squirrel. California ground squirrels (*Spermophilus beechyi*) have been known to displace *A. nelsoni* from burrows (Harris and Stearns 1991).

Giant Garter Snake *(Thamnophis gigas)*

Federal Status: Threatened

California Status: Threatened

Description: The giant garter snake is one of the largest garter snakes, attaining a total length of approximately 63 inches, with females slightly longer and proportionately heavier than males. Its diet consists of small fish, tadpoles, and frogs. Adequate water during early spring through mid-autumn to provide food and cover is an essential habitat requirement. During its active season, wetland vegetation such as cattails and bulrushes provide essential cover and foraging habitat; openings alongside waterways facilitate basking. During the dormant season of winter, *T. gigas* requires higher-elevation uplands for cover and safety from flood water, and typically inhabits small mammal burrows that lie above flood elevations. Giant garter snakes breed through March and April, and females give birth to live young from late July to early September. Brood size ranges from ten to 46 young, with an average brood size of 23. Young immediately disperse into dense cover and absorb their yolk sacs, after which they begin foraging independently. Sexual maturity averages three years for males and five years for females (Stebbins 2003).

In the Central Valley, the giant garter snake lives in agricultural wetlands and other waterways, such as irrigation and drainage canals, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands. Due to the direct loss of natural habitat, the giant garter snake relies heavily on rice fields in the Sacramento Valley, but also uses managed marsh areas in Federal National Wildlife Refuges and State Wildlife Areas. Giant garter snakes are usually absent from larger rivers due to a dearth of suitable habitat and emergent vegetative cover, and from areas with sand, gravel, or rock substrates. There have been few recent sightings of giant garter snakes in the San Joaquin Valley.

The species is now apparently extirpated or very rare in most of its former range in the San Joaquin Valley. Surveys in the 1970s and 1980s yielded some previously unknown localities and several cases of extirpation or at least severe population declines (USFWS 1993). The area of occupancy, number of sub-populations, and population size are probably continuing to decline, but the rate of decline is unknown. The decline of this species is primarily attributable to loss and degradation of habitat (USFWS 1999). Activities that may degrade habitat include maintenance of flood control and agricultural waterways, weed abatement, rodent control, discharge of contaminants into wetlands and waterways, and overgrazing in wetland or streamside habitats. Factors that may be significant in some areas include predation by and competition with introduced species, parasitism, and road kills (USFWS 1999). USFWS (1993) listed threats as habitat loss, flooding (in rice production areas), pollutants, vehicular traffic, livestock grazing, and introduced predators such as house cats and bullfrogs.

The preliminary locations of five Target Area B wells and the proposed HECA pipeline are within agricultural land and an access road, respectively, and no wetlands, riparian habitat, or other sensitive natural communities are located within the areas anticipated to be disturbed by construction and operation of said facilities. Mitigation measures intended to avoid or reduce potential impacts resulting from implementation of the BGRP upon biological resources in Target Area B to a level less than significant are set forth herein. If HEI becomes a participant in the BGRP, then BGRP facilities that are intended to serve the HECA power plant will be subject to mitigation measures set forth by the CEC, as lead agency for the HECA power plant project, in addition to the mitigation measures set forth herein.

Summary

The WEP and CEWAMP do not include construction of facilities or other features or activities that would result in potential impacts upon biological resources. The GRRP and BGRP include construction of facilities that may result in adverse impacts upon biological resources. Mitigation measures set forth below and in Section X will be implemented to avoid or reduce adverse impacts of the Program upon biological resources to a level less than significant.

Mitigation Measures

Mitigation measures set forth below are intended to avoid or reduce to a level of insignificance adverse impacts on biological resources that may result from implementation of the Program. Additionally, a biological resources assessment will be performed at each selected GRRP and BGRP well site prior to construction in order to confirm the effectiveness of the mitigation herein for each particular site. Additional site-specific mitigation will be incorporated into the GRRP and the BGRP, if necessary, in order to avoid or reduce to a level less than significant potential impacts upon biological resources resulting from construction and operation of facilities pursuant to the GRRP and BGRP.

As stated previously, if HEI becomes a participant in the BGRP, then adverse impacts upon biological resources resulting from facilities intended to serve the HECA power plant will be avoided or reduced to levels less than significant by implementing mitigation measures set forth in the CEQA analysis performed by CEC as lead agency for the HECA power plant project as well as the mitigation measures set forth herein. Preliminary mitigation measures proposed for the HECA pipeline are set forth in the HECA AFC.

1. BIO-1: Rare Plant and Sensitive Wildlife Survey

Prior to construction of GRRP or BGRP facilities, a survey for rare plants and sensitive wildlife will be conducted in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas.

2. BIO-2: Nesting Bird Survey

If construction of GRRP or BGRP facilities will commence during breeding season (March 1 to July 31), a pre-construction survey for nesting birds will be conducted in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas. If a native bird nest is found in the work area, construction will be halter or diverted within a radius from the nest as recommended by the biologist, until the nest has either fledged young or failed.

3. BIO-3: Rare Plant or Wildlife Avoidance

If rare plants or sensitive wildlife species are found in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas, the GRRP or BGRP facilities will be relocated within the well field site to avoid such species, if possible. If the facilities cannot be relocated, consultation with the appropriate resource agencies, such as the California Department of Fish and Game and/or the U.S. Fish and Wildlife Service will be conducted.

E. ARCHAEOLOGICAL AND HISTORICAL RESOURCES

Section 15064.5 of the State CEQA Guidelines sets forth criteria for determining the significance of impacts to archaeological and historical resources and is summarized as follows:

- A historical resource is:
  - A resource listed in, or determined to be eligible for listing in, the California Register of Historic Resources;
  - A resource included in a local register of historical resources or identified as significant in a historical resources survey; or
  - Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant.
- A project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.

- CEQA applies to effects on archaeological sites.
  - If an archaeological site is determined to be a historical resource, it is subject to the provisions of Section 21084.1 of the Public Resources Code, and is not subject to the limits contained in Section 21083.2 of the Public Resources Code.
  - If an archaeological site is not a historical resource, but meets the definition of a unique archaeological resource set forth in Section 21083.2 of the Public Resources Code, then the site shall be treated accordingly.
  - If an archaeological resource is neither a unique archaeological resource nor a historic resource, then the effects of the project on those resources are not considered significant effects on the environment.
- When the existence of, or probable likelihood of, Native American human remains is identified at the project site, then the project shall cooperate with the Native American Heritage Commission in compliance with Public Resources Code Section 5097.98.
- In the event of the accidental discovery or recognition of any human remains in a location other than a dedicated cemetery, all construction activities will halt; the county coroner shall be notified; and construction may only resume after the proper treatment of the human remains has been determined by the county coroner, the Native American Heritage Commission, or both.
- Lead agencies shall make provisions for historical or unique archaeological resources accidentally discovered during construction.

The areas proposed for construction and operation of facilities pursuant to the GRRP and the BGRP may contain historical resources, archaeological resources, or both, that may be impacted by construction activities pursuant to the Program. Potential environmental impacts of each Program component are discussed below.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Although the GRRP well sites have not yet been selected, the District intends to construct the GRRP wells and associated pipelines, appurtenances, and access features on Farmland, which typically has been subjected to significant surface and shallow subsurface disturbance, or on other previously disturbed land. Previous surface and subsurface

disturbance does not preclude the possible presence of previously undiscovered subsurface archaeological or historical deposits.

Adverse impacts upon recorded or accidentally discovered archaeological or historical resources by implementation of the GRRP will be avoided or reduced to a level less than significant by implementation of the mitigation measures set forth herein.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of any facilities, nor does it include any features or activities that would impact archaeological or historical resources; therefore, the WEP will not result in adverse impacts upon archaeological or historical resources.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of any facilities, nor does it include any features or activities that would impact archaeological or historical resources. Therefore, CEWAMP will not result in adverse impacts upon archaeological or historical resources.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Whenever earthmoving activities are performed, there is potential for inadvertently exposing archaeological resources. Previously unidentified archaeological sites exposed during construction, if any, must be treated as important resources until formally determined otherwise by a qualified archaeologist.

Prior to final selection of sites for Target Area A wells and Target Area B wells, a records search will be performed by a qualified archaeologist for the areas being considered for said wells. Any identified archaeological or historical sites will be considered during the final site selection process. Any adverse impacts upon archaeological or historical resources that may result from implementation of the BGRP will be avoided or reduced to a level less than significant by incorporation of the mitigation measures set forth herein.

As set forth in the HECA AFC, URS conducted a cultural resources analysis for the area along the proposed HECA pipeline alignment and surrounding areas. The cultural resources analysis included a literature review and records search, archival research, review of collected data, pedestrian surveys, archaeological monitoring of a geotechnical investigation performed in the project area, and a Native American consultation As a result of this analysis, URS identified two cultural resources sites within the area of potential effects (APE) of the HECA pipeline. Site P-15-171 had been previously recorded, and Site HECA-2008-1 was discovered as a result of current survey efforts. Descriptions of these two sites are included in the HECA AFC and are summarized below.

P-15-171 (CA-KER-171) was originally recorded only as an "occupation site". Site boundaries were not identified at the time of recordation, and no site constituent or condition information is provided. A relative site location is plotted within the Lokern 7.5-Foot U.S. Geological Survey (USGS) Quadrangle (map confidential pursuant to the Archaeological Resources Protection Act of 1979 [USC 16, Chapter 1B, Sections 470a]). The site was not relocated during the current study included in the HECA AFC. The purported site vicinity has been highly disturbed by various agricultural activities and the construction of the West Side Canal. The site, as it was plotted, is located along the proposed HECA pipeline alignment.

HECA-2008-1 consists of a prehistoric lithic scatter that was identified at the bottom of the West Side Canal. The site's artifact assemblage consists of lithic debitage, a projectile point tip fragment, and three pieces of burnt faunal bone. The debitage is composed of Monterey and Franciscan chert, which are both local source materials. This site is a small artifact scatter, but it is believed to represent a much larger site. The site was found at the bottom of a water canal along the eastern edge in a long, thin line. It was originally interpreted to be the re-deposition of artifacts from a site further up the canal. This interpretation was later rejected because it was unlikely that artifacts would have deposited so regularly along one side of the canal. It is more likely that the canal construction and upkeep has cut horizontally into the edge of a deeply stratified site that is buried 1.8 meters below the modern ground surface. Because this site is located within the Buena Vista Slough, this is entirely probable. The presence of the artifacts suggests that further subsurface cultural context remains intact well below the levels of modern agricultural disturbances. This site area is bisected by the proposed HECA pipeline alignment.

According to the HECA AFC, the two sites listed above have not been evaluated for listing on the National Register of Historic Places, the California Register of Historical Resources, or a local register of historic resources; therefore, these unevaluated archaeological resources must be treated as important resources until formally determined otherwise.

The cultural resources archaeological analysis included in the HECA AFC concluded that all archaeological sites situated within the project APE of the HECA pipeline, including any previously unknown sites that may be inadvertently exposed during construction activities, may be affected by the project. Mitigation measures set forth herein are intended to avoid or reduce to a level less than significant adverse impacts upon cultural resources that may result from implementation of the BGRP.

Summary

The WEP and CEWAMP components of the Program do not include construction of facilities or other features or activities that would be anticipated to result in potential impacts upon cultural (archeological or historical) resources.

Implementation of the GRRP and BGRP components of the Program include construction of facilities that may result in potential impacts upon archaeological or historical resources. Mitigation measures listed below are intended to avoid, or reduce to a level less than significant, adverse impacts upon cultural resources.

Mitigation Measures

Provisions for mitigation measures related to impacts upon historical resources are included in Section 15126.4(b) of the State CEQA Guidelines, and mitigation measures in accordance with these provisions are incorporated into the Program, as described below, in order to avoid or reduce adverse impacts of the Program upon historical and archaeological resources to below a level of significance.

The following mitigation measures are incorporated into the Program and are intended to avoid, or reduce to a level less than significant, potential impacts upon archaeological and historical resources (collectively, cultural resources) that may result from implementation of the Program.

1. CUL-1: Retain a Qualified Professional Archaeologist

Prior to commencing construction of facilities pursuant to the Program, a qualified professional archaeologist will be retained as the cultural resources specialist (CRS) who will be responsible for implementation of Mitigation Measures CUL-2 through CUL-8.

2. CUL-2: Inventory the Program's Area of Potential Effects (APE) for Cultural Resources

As the specific locations of Program facilities have yet to be determined, and as no cultural resources inventory efforts have been conducted within the majority of the Program vicinity, an inventory of cultural resources is necessary.

Once the design of Program facilities has been developed, the CRS will identify the Program's Area of Potential Effects (APE) based on this design. Once the APE has been determined, requests for information from the California Native American Heritage Commission (NAHC) and appropriate office of the California Historical Resources Information System (CHRIS) will be made. Following these efforts, requests for information from the Native American groups and individuals identified by the NAHC will be made. Although such contact efforts were conducted for the HECA power plant project, they were for that project footprint (including the HECA pipeline) and were not focused on the Program.

Following the consultations listed above, the APE will be subject to an intensive archaeological pedestrian reconnaissance. The entire APE will be surveyed using parallel transects of no greater then twenty meters by a team of qualified professional archaeologists. All identified archaeological resources will be recorded using the appropriate California Department of Parks and Recreation (DPR) Archaeological Site Recordation Forms.

The results of the inventory efforts, including Native American consultation, will be documented in a Confidential Archaeological Technical Report.

3. CUL-3: Avoidance

Prior to commencement of construction, a records search of each site planned for construction of facilities pursuant to the Program will be conducted. Because avoidance is the preferred treatment of archaeological and historical resources, sites identified as containing cultural resources within the vicinity of facilities proposed pursuant to the Program will be avoided where feasible. Furthermore, if a potentially significant cultural resource is discovered during construction, the construction plans will be modified, if possible, to avoid that resource. If there are no feasible means for avoiding the resource, then the cultural resource will be tested. If the cultural resource is found to be significant, the measures described below will be implemented in consultation with BVWSD and Program participants and associated CEQA lead agencies, as applicable.

For any important or potentially important cultural resource that can be avoided by modification of project plans, the cultural resource will be temporarily fenced or otherwise demarcated on the ground, and the area will be designated environmentally sensitive. Construction equipment will be directed away from the cultural resource, and construction personnel will be directed to avoid entering the area. Where cultural resource boundaries are unknown, the protected area will include a buffer zone with a 100-foot radius. In some cases, additional archaeological work could be required to demarcate the boundaries of the cultural resource to assure avoidance.

4. CUL-4: Testing

The CRS will prepare and submit to BVWSD, and appropriate participants and CEQA lead agencies, as applicable, an archaeological testing plan (ATP) for review and approval. All archaeological testing will be conducted in accordance with the approved ATP. The ATP will identify the property types of the expected archaeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the ATP is to determine, to the extent possible, the presence or absence of archaeological

or historical resources; to identify any archaeological or historical resources found; and to evaluate the historical significance of any archaeological or historical resources found.

Upon completion of the archaeological testing, the CRS will submit a written report of the findings to BVWSD and appropriate participants and lead agencies, as applicable. If the CRS finds that significant archaeological resources may be present based on the ATP, then BVWSD (and participants and lead agencies, as applicable), in consultation with the CRS, will determine if additional measures are warranted. Additional measures that may be undertaken include additional archaeological testing, archaeological monitoring, an archaeological data recovery program, or a combination of these. If the CRS determines that a significant cultural resource is present, and that the resource could be adversely affected by the proposed project, then BVWSD or appropriate participants and lead agencies, as applicable, at their discretion and in consultation with the CRS, will either:

- Redesign all or part of the proposed Program facilities, as practicable, to avoid any adverse effect on the important cultural resource; or

- Implement a data recovery program.

If the cultural resource being subject to archaeological testing is associated with the Native American inhabitation of the region, the District (or appropriate lead agency) may request that a Native American monitor be present during the implementation of this mitigation measure.

5. CUL-5: Data Recovery

Data recovery shall be implemented in the event that an adverse impact to an important archaeological or historical resource cannot be avoided. The archaeological data recovery program shall be conducted in accordance with an archaeological data recovery plan (ADRP). The CRS(s), Program participant(s) and BVWSD (and/or appropriate lead agency) will meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The CRS will submit a draft ADRP to the District. The ADRP will identify how the proposed data recovery program will preserve the significant information that the cultural resource is expected to contain. That is, the ADRP will identify what scientific

or historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable resource questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the Program. Destructive data recovery methods will not be applied to archaeological resources, or portions of resources, if nondestructive methods are practical. If the cultural resource being subject to data recovery is associated with the Native American inhabitation of the region, the District (and/or appropriate lead agency) may request that a Native American monitor be present during implementation of this mitigation measure.

6. CUL-6: Construction Monitoring

Given the archaeological sensitivity of the Program vicinity, an archaeological monitoring program will be implemented. A Cultural Resources Monitor (CRM) will be appointed and will be responsible for keeping a daily monitoring log of construction activities, observations, types of equipment used, problems encountered, and any new archaeological discovery (including the cultural material observed and its location). Photographs will be taken as necessary to supplement the documentation. These logs will be signed and dated by the CRM and included within the monitoring report. It may be necessary that multiple CRMs be appointed given the geographical extent of facilities pursuant to the Program.

The archaeological monitoring program will include the following provisions, at a minimum:

- The CRS, in consultation with BVWSD (and/or appropriate lead agency), will determine what activities will be archaeologically monitored. In most cases, any soil-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., will require archaeological monitoring because of the risk these activities pose to potential archaeological resources and to their depositional context;

- BVWSD (and/or appropriate CEQA lead agency) and the CRS will advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource;

- The CRM(s) will be present on construction sites pursuant to the Program until BVWSD (and/or appropriate CEQA lead agency) has, in consultation with the CRS, determined that related construction activities could have no effect on significant archaeological or historical deposits;

- The CRM(s) will record, and are authorized to collect, soil samples and artifactual material as warranted for analysis;

- If an intact archaeological or historical deposit is encountered, all soil-disturbing activities in the vicinity of the deposit will cease. The CRM(s) will be empowered to temporarily halt or redirect construction activities and equipment until the resource is evaluated. The CRS will immediately notify BVWSD and/or the appropriate CEQA lead agency of the encountered cultural deposit. The CRS will make a reasonable effort to assess the identity, integrity, and significance of the deposit, and shall present the findings of this assessment to BVWSD and/or the appropriate CEQA lead agency.

If unanticipated resources are discovered during construction, they will be addressed under the procedures set forth in CEQA Guidelines Section 15064.5. If possible, the resource(s) will be avoided first through design modification, and second through protective measures as described above. If the resource(s) cannot be avoided, BVWSD and/or the appropriate CEQA lead agency will consult with the CRS with regard to resource importance and significance. If it is determined that the resource is important, then measures to mitigate impacts to below a level of significance will be devised in consultation with the CRS, and will be carried out by BVWSD, the appropriate CEQA lead agency, the Program participant(s), or a combination of these.

Whether or not significant cultural resources are encountered, the CRS will submit monthly monitoring progress reports and a written report of the findings of the monitoring program to the BVWSD and appropriate CEQA lead agency, as applicable.

7. CUL-7: Construction Crew Education

Prior to commencing construction, all construction crews will be advised of the regulatory protections afforded to cultural resources. The crews will also be informed of procedures relating to the inadvertent exposure of archaeological or historical resources. The crews will be cautioned not to collect artifacts and will be asked to inform a construction supervisor if apparent cultural remains are uncovered.

8. CUL-8: Discovery of Human Remains

Recorded sites, as well as previously undiscovered sites, situated within the vicinity of program facilities may contain human remains. Human remains are often fragile and should be treated with care and respect at all times. The discovery of human remains involves both legal and archaeological issues. Discovery of any human remains in the vicinity of Program facilities is subject to criteria set forth by the Native American Graves Protection and Repatriation Act, 43 CFR Part 10, as amended, 1999. Therefore, the following procedures will be implemented immediately upon the discovery of human remains:

- Stop all excavation work and, using appropriate safety precautions, with a minimum of further disturbance to the remains, allow the Cultural Resources Monitor (CRM) to verify that the discovery is, in fact, human skeletal material. If the remains are determined to be other than human remains, then construction activities may resume upon written authorization by BVWSD or appropriate CEQA lead agency, as applicable.

- If the remains are determined to be human, the CRM will immediately contact, by telephone, the Kern County Public Works Department, who will in turn contact the Kern County Sheriff Department to report the discovery. In addition to the Sheriff, the County Coroner will also be contacted and informed of the

discovery. After notifying the appropriate authorities, the CRM will then immediately notify BVWSD and the appropriate CEQA lead agency, as applicable.

- In the event that the County Coroner determines that the human remains are Native American, the CRM will immediately notify the California Native American Heritage Commission (NAHC), who shall appoint a Most Likely Descendant (MLD) (Public Resources Code, Section 5097.98). BVWSD or the appropriate CEQA lead agency, the CRM, and the MLD shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects.

Work within the immediate vicinity of the find will remain halted until BVWSD or the appropriate CEQA lead agency, after consultation with the, CRS or CRM, MLD, and relevant agencies, provides written authorization for work to resume in the vicinity of the discovery.

F. PALEONTOLOGICAL RESOURCES

Federal, state, and local regulations and policies protect paleontological resources. These include the federal Paleontological Resources Preservation Act, the California Public Resources Code, and the Kern County General Plan (2004). In addition to those listed here, other federal and state regulations pertaining to the preservation of important historical, cultural, and natural aspects of our heritage are interpreted to include fossils in one or more of these categories.

The federal Paleontological Resources Preservation Act of 2002 limits the collection of vertebrate fossils and other rare and scientifically significant fossils to qualified researchers who first obtain a permit from the appropriate state or federal agency and who agree to donate any recovered specimens to recognized public institutions where they will remain accessible to the public and to other researchers.

Section 30244 of the California Public Resources Code states that "where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required."

Section 1.10.3(M) of the Kern County General Plan (2007) states that "in areas of known paleontological resources, the County should address the preservation of these resources where feasible."

The Program may result in adverse impacts upon paleontological resources, as discussed pertaining to each Program component below. Any adverse impacts of the Program upon paleontological resources will be avoided or reduced to below a level of significance by incorporating the mitigation measures set forth herein.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Earthmoving activities performed during construction of facilities pursuant to the GRRP may result in adverse impacts upon paleontological resources, making such resources unavailable for future scientific investigation. The precise locations of facilities pursuant to the GRRP have not yet been determined; therefore, it is not known whether such sites would be deemed sensitive for paleontological resources. Because some areas of the Buttonwillow Service Area contain sediments that have been deemed sensitive to paleontological resources, it has been presumed that any site selected for construction of facilities pursuant to the GRRP may contain subsurface deposits of paleontological significance.

As discussed below for portions of the BGRP, the soil types common within the Buttonwillow Service Area (Tulare Formation and Quaternary alluvium) are categorized as having high sensitivity to paleontological resources based on guidelines provided by the Society of Vertebrate Paleontology (SVP 1995). Mitigation measures incorporated into the Program are set forth in *Mitigation Measures* below, and are intended to avoid or reduce adverse impacts that may result from implementation of the GRRP upon paleontological resources to a level less than significant.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of any facilities, nor does it include any features or activities that would have the potential to impact paleontological resources; therefore, the WEP will not result in adverse impacts upon paleontological resources.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of any facilities, nor does it include any features or activities that would have the potential to impact paleontological resources; therefore, the CEWAMP will not result in adverse impacts upon paleontological resources.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Earthmoving activities performed during construction of facilities pursuant to the BGRP may result in adverse impacts upon paleontological resources, making such resources unavailable for future scientific investigation. The precise locations of facilities pursuant to the BGRP have not yet been determined; therefore, it is not known whether such sites would be deemed sensitive for paleontological resources. Because some areas of the Buttonwillow Service Area contain sediments that have been deemed sensitive to paleontological resources, it has been presumed that any site selected for construction of facilities pursuant to the BGRP may contain subsurface deposits of paleontological significance.

A paleontological resources inventory and impact assessment was prepared by Paleo Resource Consultants (PRC) for the proposed preliminary site and vicinity of the conveyance pipeline (HECA pipeline) associated with the five initial Target Area B wells. A discussion of said inventory and impact assessment is included in Section 5.16 of the HECA AFC, and portions of the discussion are summarized below.

PRC identified two stratigraphic units, the Tulare Formation and Quaternary alluvium, within the project vicinity "that have yielded fossilized remains of extinct species of continental vertebrates and other types of organisms at previously recorded fossil sites in the

region". Both the Tulare Formation and Quaternary alluvium are categorized as having high sensitivity to paleontological resources based on guidelines provided by the Society of Vertebrate Paleontology (1995).

Mitigation measures intended to avoid, or reduce to a level less than significant, adverse impacts upon paleontological resources that may result from implementation of the BGRP are discussed in *Mitigation Measures* below.

Summary

The WEP and CEWAMP components of the Program do not include construction of facilities, nor do they include features or activities that would result in any adverse impacts upon paleontological resources.

Construction of facilities pursuant to the GRRP and BGRP may result in adverse impacts upon paleontological resources. Mitigation measures designed to avoid or reduce potential impacts that may result from implementation of the GRRP and BGRP upon paleontological resources to a level less than significant are incorporated into the Program and are described below.

Mitigation Measures

Mitigation measures PALEO-1 through PALEO-7 are intended to avoid or reduce adverse impacts upon paleontological resources that may result from implementation of the Program to a level less than significant.

1. PALEO-1: Retain a Qualified Professional Paleontologist

Prior to any Program-related excavations, a qualified professional paleontologist will be retained as the paleontological resources specialist (PRS) who will be responsible for implementation of Mitigation Measures PALEO-2 through PALEO-7.

2. PALEO-2: Inventory for Paleontological Resources

As the specific locations of Program facilities have not yet been determined, and as a paleontological resources inventory has not been conducted within the majority of the Program vicinity, an inventory of paleontological resources is necessary.

Once design of Program facilities has been developed, the PRS will identify the Program's Area of Potential Effects (APE) based on this design. Once the APE has been identified, a literature and museum records search will be conducted to determine the location and extent of any known paleontological resources. Although such searches were conducted for the HECA power plant, they were for that project footprint (including the HECA pipeline) and did not include other components of the Program.

Following the records search, a paleontological resources field survey will be conducted on exposed stratigraphic units within the APE to identify previously unknown fossil localities, and to determine the nature and extent of sensitive stratigraphic units likely to be encountered in the APE. The results of the inventory efforts will be recorded in a Confidential Paleontological Resources Technical Report.

3. PALEO-3: Paleontological Monitoring and Mitigation Plan

The designated PRS will prepare a paleontological resources monitoring and mitigation plan, which will include provisions for preconstruction coordination; construction monitoring; emergency discovery procedures; sampling and data recovery, if needed; preparation, identification, analysis, and museum curation of any fossil specimens and data recovered; and reporting. This monitoring and mitigation plan will be consistent with SVP (1995) standard guidelines for the mitigation of construction-related adverse impacts on paleontological resources, as well as the requirements of the designated museum repository for any fossils collected (SVP 1996).

4. PALEO-4: Construction Personnel Education

To enhance awareness of potential impacts to paleontological resources prior to commencing construction of facilities pursuant to the Program, construction personnel

involved with earth-moving activities should be informed (1) that fossils may be discovered during earth-moving activities; (2) that these fossils are protected by laws; (3) about the appearance of common fossils; and (4) about proper notification procedures. This worker training should be prepared and presented by a qualified paleontologist.

5. PALEO-5: Paleontological Monitoring

Prior to any Program-related ground disturbance, the PRS will conduct a field survey of sensitive stratigraphic units that will be disturbed within the APE, and any fossils discovered will be salvaged. BVWSD or the appropriate CEQA lead agency, as applicable, in consultation with the Program participant, the PRS, or both, will determine what activities shall be monitored. In most cases, any activities that expose previously undisturbed sediments, such as excavation, grading, trenching for utilities installation, foundation work, etc., will require paleontological monitoring because of the risk these activities pose to potential paleontological resources and to their depositional context. Some excavation activities, such as well-drilling, may not need to be monitored, due the low probability of identifiable paleontological resources being salvaged. Monitoring will not need to be conducted in areas where sediments have been previously disturbed or in areas where exposed sediments will be buried, but not otherwise disturbed. Construction monitoring will be conducted to ensure that unanticipated discoveries are addressed in an appropriate and timely manner.

6. PALEO-6: Preparation, Identification, and Curation

Upon completion of construction activities, any salvaged fossil specimens will be prepared, identified, and accessioned into a qualified museum repository for permanent storage.

7. PALEO-7: Final Report

The PRS will prepare a Paleontological Resources Monitoring and Mitigation Program Final Report containing the results of the paleontological monitoring and mitigation plan implemented during construction. Said report will be provided to BVWSD, appropriate lead agencies, and Program participants, as appropriate.

G. GEOLOGY AND SOILS

Based on the California Department of Conservation Division of Mines and Geology publication titled Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada (1998), the fault located nearest the Program area is the White Wolf Fault, which is located approximately six miles southeasterly of the Maples Service Area. The San Andreas Fault (Parkfield) is located greater than twenty miles westerly of the Buttonwillow Service Area.

According to the Soil Survey of Kern County, California, Northwestern Part, issued by the United States Department of Agriculture Soil Conservation Service (September 1988), soils in the Buttonwillow Service Area consist primarily of the Buttonwillow Series and Lokern Series.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Specific sites of the facilities proposed pursuant to the GRRP have not yet been determined; however, each potential well site will be evaluated for the proximity of known faults and for incompatible soil conditions prior to final site selection. Standard construction BMPs will be incorporated during construction in order to avoid, or reduce to a level of insignificance, adverse impacts that may occur from soil erosion, storm water runoff, or both, as a result of construction activities pursuant to the GRRP. A list of said standard construction BMPs is available from the District upon request.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities, nor does it include features or activities that would adversely impact geologic resources or soils; therefore, the WEP will not result in significant impacts upon geologic resources or soils, and mitigation measures are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities, nor does it include features or activities that would adversely impact geologic resources or soils in the Program area.

Therefore, the CEWAMP will not result in significant impacts upon geologic resources or soils, and mitigation measures are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Specific sites of facilities pursuant to the BGRP have not yet been selected; however, each potential well or pipeline location will be evaluated for the proximity of known faults and for incompatible soil conditions prior to final site selection. Standard construction BMPs will be incorporated during construction in order to avoid, or reduce to a level of insignificance, adverse impacts that may occur from soil erosion, storm water runoff, or both, as a result of construction activities pursuant to the BGRP. A list of the standard construction BMPs is available from the District upon request.

Five of the proposed Target Area B wells and the HECA pipeline have been preliminarily located as shown on Figure 10 and are intended to serve the HECA power plant. Facilities proposed pursuant to the BGRP that are intended to serve the HECA power plant are additionally subject to the review, approval, and mitigation measures required by CEC, as lead agency for the HECA power plant project. Preliminary review and mitigation measures for the HECA pipeline are set forth in the HECA AFC.

According to the HECA AFC, "the general process for constructing and installing the underground linear facilities [HECA pipeline] will involve clearing of brush, grading and trench excavation, installation of the pipelines, connecting linear facilities, lowering facilities into trenches, backfilling, compaction, and revegetation. Once pipelines are covered, hydrostatic testing will commence to ensure structural integrity."

The HECA AFC further states that "during construction and installation, the soil within the alignment of the linear facilities [HECA pipeline] may become more susceptible to erosion. The extent of this construction-related impact on soils and agricultural lands, however, will be temporary, and appropriate BMPs will be implemented to minimize potential impacts."

The HECA AFC concludes that "construction, installation, operation, and maintenance of the underground process water…pipelines will result in minor, mostly temporary, soils

impacts." Construction of wells pursuant to the BGRP will similarly result in minor impacts upon soils in the Program area.

Summary

None of the Program components include any facilities that are intended for occupation; therefore, the Program will not result in a substantial risk of injury or death related to geologic or soils hazards. The WEP and the CEWAMP do not include construction of facilities or any other features or activities that may adversely affect soils; therefore, these components will not result in adverse impacts upon soils or geologic resources in the Program area. The GRRP and BGRP include construction of facilities and are expected to result in temporary adverse impacts upon soils in the Program area, particularly soil erosion and sedimentation.

Mitigation measures incorporated herein are intended to avoid or reduce potential adverse impacts, upon soils and upon water quality associated with soil erosion, which may result from construction of facilities pursuant to the Program to a level less than significant. Mitigation measures incorporated herein may be modified, as appropriate, based on conditions of the specific site(s) selected for construction.

Mitigation Measures

The following mitigation measures will be implemented, thereby avoiding or reducing to a level of insignificance any adverse impacts upon soils and upon water quality associated with soil erosion that may result from construction and operation of facilities pursuant to the Program.

An acceptable level of soil erosion, as used herein, is defined as that amount of soil loss that will not affect (i.e., limit) the potential long-term beneficial uses of the soil as a growth medium, or adversely affect water resources because of accelerated erosion and subsequent sedimentation.

1. SOIL-1: Grading

Conduct grading operations in compliance with good industry standard practices and Kern County grading permit requirements.

2. SOIL-2: Storm Water Pollution Prevention Plan

Conduct construction and operational activities in accordance with a construction phase Storm Water Pollution Prevention Plan (SWPPP) and associated monitoring program.

3. SOIL-3: Erosion Control Measures

Temporary erosion control measures will be implemented as needed. Typically, temporary erosion control measures include revegetation, slope stabilizers, dust suppression, construction of berms and ditches, and sediment barriers. Vegetation is the most desirable form of erosion control because it stabilizes the soil and maintains the landscape.

During construction of facilities pursuant to the Program, employment of control measures will minimize the wind-blown erosion of soil from construction areas, such as dust suppression (e.g. spraying water) and timely vegetation of barren construction areas. BMPs identified in the SWPPP will be in place prior to commencement of ground-disturbing activities. At this time, these plans do not exist, but they will be developed and implemented prior to initiation of any on- or off-site ground-disturbing activities.

Sediment barriers such as straw bales or silt fences, will be used as necessary to slow runoff and trap sediment. Runoff retention basins, drainage diversions, and other large-scale sediment traps are not expected to be needed because of the relatively level topography. Soil stockpiles generated during construction will be covered and protected from precipitation if left on the site for extended periods of time.

4. WATER-1: General Construction Activity Storm Water Permit

Prior to beginning any clearing, grading, or excavating activities associated with construction of facilities pursuant to the Program, a SWPPP will be prepared and implemented pursuant to the requirements of the *General Permit for Discharges of Storm Water Associated with Construction Activity* issued by the State Water Resources Control Board.

H. HAZARDS AND HAZARDOUS MATERIALS

Components 1 through 4 (GRRP, WEP, CEWAMP, BGRP)

1. Flight Hazards

The public airport nearest the Buttonwillow Service Area is the Buttonwillow-Kern County Airport, which is located in Section 2, Township 30 South, Range 23 East, MDM, approximately one mile southwesterly of the western Buttonwillow Service Area boundary. Facilities proposed for construction pursuant to the Program are below ground or low-lying and unobtrusive and do not have the potential to interfere with air traffic or flight patterns. The Program does not include any facilities, features, or activities that could pose a safety hazard for people residing or working in the Program area.

2. Fire Hazards

There is an insignificant risk of fire during construction activities and from the operation of electric motors on well pumping units pursuant to the GRRP and BGRP. The Program does not otherwise have the potential to expose people or structures to a significant risk of loss, injury, or death involving wildland fires. The risk of fire resulting from the Program is less than significant.

3. Hazardous Materials

The Program does not involve the generation, use, handling, transport, storage, or disposal of any hazardous materials, substances, or waste. Facilities proposed pursuant to the GRRP and BGRP will not be located on sites that are listed as hazardous materials sites in the EnviroStor database, which is maintained by the California Department of Toxic Substances Control and is searchable on their website, www.envirostor.dtsc.ca.gov/public. The Program will not result in adverse impacts relating to hazardous materials.

Summary

As stated above, the Program will not result in significant flight hazards, fire hazards, or adverse impacts resulting from hazardous materials; therefore, no mitigation measures are needed in order to avoid, or reduce to a level less than significant, potential impacts relating to hazards or hazardous materials.

I. HYDROLOGY AND WATER QUALITY

Groundwater extractions pursuant to the Program will be conducted in accordance with the Buena Vista Water Storage District Groundwater Monitoring Plan (Groundwater Monitoring Plan) and the Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (MOU), copies of which are included in Appendices B and C herein, respectively.

As set forth in its Groundwater Monitoring Plan, the District monitors depths to groundwater quarterly and monitors groundwater quality at least annually for standard irrigation constituents and other constituents of concern. The MOU constitutes an agreement pertaining to groundwater recharge and sets forth objectives and criteria intended to avoid adverse impacts upon the groundwater aquifer and the surrounding groundwater users. Said MOU was executed in October 2002, effective January 1, 2003, by and between the following parties:

- Buena Vista Water Storage District
- Semitropic Water Storage District
- Henry Miller Water District
- Kern County Water Agency
- Kern Delta Water District
- Kern Water Bank Authority
- Rosedale-Rio Bravo Water Storage District
- West Kern Water District

Although the Program is not expected to result in adverse impacts upon the groundwater aquifer or other water users in the vicinity of the Program area, the District will mitigate any

unforeseen impacts as agreed upon by the entities listed above and as set forth in the MOU. A description of potential impacts upon hydrology and water quality is discussed below for each Program component.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The District has historically stored water in the underlying groundwater basin. In addition to the District's existing groundwater banking programs (refer to *Existing Water Supply and Use* in subsection II(A)(3) herein), the GRRP will include storing water within, and later recovering stored water from, the groundwater basin.

Total District groundwater replenishment currently exceeds total District groundwater extraction by an annual average of approximately 46,000 AF/yr (refer to Appendix A). Currently, there are approximately 200 groundwater wells within the District's Buttonwillow Service Area. Of the 200 wells, seven wells are owned and operated by the District, and the remaining wells are owned and operated by landowners in the area. The GRRP includes the construction and operation of up to seventeen additional District-owned groundwater recovery wells over the life of the project in order to provide adequate recovery capacity and necessary operational flexibility.

Groundwater recharge pursuant to the GRRP includes direct groundwater recharge (via canal seepage, existing recharge ponds, and irrigation deep percolation), in-lieu methods (via use of surface water in lieu of pumping groundwater), or a combination of these methods.

Groundwater recovery pursuant to the GRRP includes the extraction of up to 20,000 AF/yr of previously recharged groundwater via up to seventeen proposed District-owned wells, existing District-owned wells, the indirect use of landowner wells within the District through reductions in surface water supply allocations, the use of individual volunteer landowner wells pursuant to agreements with the District, the use of other wells within the Program area, or a combination of these methods.

The District's Water Resources Analyst has reviewed the proposed GRRP and has provided an evaluation of the potential impacts to the underlying groundwater aquifer that may result

from implementation of the GRRP. The results of this evaluation are described in additional detail in the Memorandum, Review of the Potential Environmental Impacts of the Buena Vista Water Storage District's Proposed Groundwater Recharge and Recovery Project, from Robert A. Crewdson, Ph.D. to Dan Bartel, Buena Vista Water Storage District, dated September 20, 2009 (GRRP Memorandum), a copy of which is included in Appendix G. Based on the review and evaluation discussed in said Memorandum, and summarized below, the GRRP will not have a significant adverse impact upon the storage volume, water levels, or water quality of the underlying aquifer.

The GRRP Memorandum states that "…aquifer storage and recovery volumetrics will be basin-neutral and that the long-term District water balance will remain basin-positive at every GRRP operating level up to and including full proposed extraction capacity." The GRRP Memorandum further states that "the separate impacts of project recharge and recovery [will] have no significant impact on the aquifer." Additionally, "all surface waters which might be stored in the aquifer under the District have lower TDS contents and lower COC (Constituents of Concern) concentrations than the naturally occurring waters within the aquifers. The recharge of lower-TDS content surface waters will have a basin-positive impact of reducing the TDS content of the underlying aquifers."

For the reasons discussed above, the GRRP will not adversely impact hydrology or water quality. Refer to Appendix G and to *Mitigation Measure* below.

2. Component 2: Water Exchange Project (WEP)

In wet years, the District typically has access to large quantities of water supplies from its water rights on the Kern River. One commonly used method for using and storing wet-year supplies for later use is an "exchange". In an exchange, the District delivers a portion of its wet-year supplies to another entity. The other entity will later return a predetermined or negotiated quantity of its water to the District. Exchanges allow the District to better balance dry-year supplies with demands.

Implementation of the WEP will benefit both the District and the WEP participants. At this time, potential participants in the WEP include Poso Creek Water Company, Cawelo Water District, Kern Delta Water District, North Kern Water District, and Improvement District No. 4 of the Kern County Water Agency.

Water exchanged pursuant to the WEP will be that which is deemed not immediately necessary for the uses or purposes of the land and landowners within the District's Service Area. Implementation of the WEP will not result in an adverse impact upon hydrology or water quality. Mitigation intended to avoid or reduce any unforeseen potential impacts on hydrology or water quality to a level less than significant is included in *Mitigation Measure* below.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

Areas within a portion of the Buttonwillow Service Area, termed "Northern Area Lands" (generally north of Lerdo Highway), have been, or will be, encumbered by conservation easements. The CEWAMP consists of acquiring and actively managing some or all of the water service rights in the Northern Area Lands that have already entered into, or that will enter into, conservation easement programs and that have transitioned away from full agricultural production.

The conservation easements typically require that 40% of the surface water that would typically be available to the land in any one year still be made available to such land. The remaining 60% of the water can be used on other land within the District. Water intended for inclusion in the CEWAMP does not include water that has been designated for use in habitat restoration by conservation easements.

Because of the terms of the conservation easements that are, or will be, in place on portions of the Northern Area Lands, surface water adequate for the restoration of natural habitat will remain available to said lands. Because agricultural activities have ceased, or have been greatly reduced, on said lands, irrigation demands on these lands have also been significantly reduced, resulting in an estimated potential net water availability of approximately 5,000 AF/yr.

For the reasons set forth above, the CEWAMP will not result in adverse impacts upon hydrology or water quality. Mitigation intended to avoid or reduce any unforeseen potential impacts upon hydrology or water quality to a level less than significant is included in *Mitigation Measure* below.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

a. Facilities and Operation

The BGRP includes the extraction of up to 12,000 AF/yr of brackish groundwater from the aquifer. Of this quantity, in the event that HEI participates in the BGRP, approximately 7,500 AF/yr is anticipated to be extracted from Target Area B and conveyed by the HECA pipeline for use at the HECA power plant. Extraction of the remaining quantities (up to a total extraction of 12,000 AF/yr for the BGRP) may be through Target Area A wells, Target Area B wells, existing District-owned or landowner wells, tile drainage systems through individual volunteer landowner agreements, or other methods designed to remove brackish groundwater that may be developed during the environmental review and planning process.

Target Area A wells are designed to alleviate the shallow perched brackish groundwater conditions that are present throughout most of the northern portion of the Buttonwillow Service Area, generally north of 7th Standard Road. Specific locations of the Target Area A wells have not been selected, but will consist of a grid-array of up to 40 low-flow shallow groundwater extraction wells. Target Area A wells will be located and operated in a manner designed to achieve a uniform lowering of the perched water levels, thereby improving affected areas for agricultural use (Crewdson 2009).

The locations of the Target Area B wells have not yet been selected; however, sites for five of the ten Target Area B wells have been preliminarily proposed and are shown in Figure 10. These five wells would be spaced at approximate intervals of one-quarter mile and would extend to approximate depths of 300 to

400 feet below ground surface. If HEI participates, the HECA pipeline would be installed predominately in the District's unpaved service road that is along the easterly bank of the West Side Canal, extending approximately fifteen miles from the five Target B wells to the HECA power plant. Preliminary locations of the five Target Area B wells and HECA pipeline are shown in Figure 10.

In the event that HEI participates in the BGRP, the five Target Area B wells are anticipated to operate continuously, with three of the wells operational and two of the wells redundant in order to serve as backup wells during repair and maintenance of operational wells. Maximum pumping rates are expected to total 4,650 gpm, which is equivalent to 1,550 gpm per well for each of the three operational wells. Pumping is expected to occur continuously for 25 years (HECA AFC).

b. Groundwater Quality

The Northern Area Lands overlie aquifers characterized by TDS concentrations ranging from 1,000 to 4,000 mg/l, which exceed the secondary MCL of 1,000 mg/l set forth by the CDPH. Shallow perched groundwater TDS concentrations in the Northern Area Lands range from 1,000 to 5,000 mg/l. The shallow perched brackish groundwater in these areas tends to be present within the root zone, which adversely impacts crop yield and quality, and without treatment, said brackish water is not very suitable for use as drinking water or irrigation water.

Target Area A wells will be configured in a grid-array formation in order to uniformly lower the widespread perched water levels in the northern portion of the Buttonwillow Service Area, thereby improving conditions for agricultural use in the affected areas (Crewdson 2009).

According to Crewdson (2009), District lands overlie part of a larger aquifer system which receives lateral (horizontal) recharge waters from two different sources. Lower-TDS water recharges the aquifer from the east, and higher-TDS water recharges the aquifer from the west. Five of the Target Area B wells have

been preliminarily located along the central western boundary of the Buttonwillow Service Area, where the depth to groundwater ranges from 20 to 80 feet below ground surface. Groundwater in this southern area (generally south of 7th Standard Road) has TDS concentrations ranging from 1,000 to 4,000 mg/l.

The preliminary configuration of the five proposed Target Area B wells is intended to intercept the inflow of brackish groundwater from the west, creating a zone of blending to the east of the five wells, within which a greater proportion of lower-TDS water from the east will gradually lower the overall TDS within that zone over time. This will benefit the area easterly of the five Target Area B wells by lowering the TDS concentration in the groundwater underlying that area. The area of beneficial impact is expected to expand slowly over time, with the rate of expansion depending on the long-term extraction rate and aquifer properties (Crewdson 2009).

c. Groundwater Level Drawdown

Target Area A wells are intended to uniformly lower shallow perched brackish water levels in the northern portions of the Buttonwillow Service Area. This will result in a lowering of the perched groundwater levels and subsequent improvement of conditions suited to agricultural activities in the area. Construction and operation of Target Area A wells will not result in decreased groundwater levels or other adverse impacts upon the underlying aquifer (Crewdson 2009).

As set forth in the HECA AFC and Appendix O to the HECA AFC, URS utilized groundwater modeling to evaluate the net effect of pumping by the five preliminary Target Area B wells that are expected to serve the HECA power plant. The groundwater model simulated pumping from the five Target Area B wells, assuming the following:

- The three central wells pumping constantly and simultaneously, with the two outer wells redundant;

- A well field pumping rate of 7,500 AF/yr, or 4,650 gallons per minute (1,550 gallons per minute for each of the three pumping wells), which represents the upper-limit process water demand for the HECA power plant;

- A steady and continuous pumping rate throughout the 25-year model simulation; and

- A constant pumping level of 30 feet below ground surface, which is the average in the vicinity of the proposed wells, based on data collected in 2008 by BVWSD.

According to BVWSD's project-specific well survey of July 2009, there are nine operational irrigation water supply wells within one-half mile of the proposed Target Area B well field (as depicted on Figure 10) within the Buttonwillow Service Area. Depending on location, drawdown between 3.9 and 37 feet would be expected, but is not considered significant. While the maximum simulated drawdown of approximately 37 feet occurs at the central pumping well, drawdown decreases radially outward from the pumping wells such that maximum drawdown 200 feet east, one-half mile east and one mile east of the pumping wells is 18.5, 5.2, and two feet, respectively (HECA AFC).

Model simulation results indicate that maximum drawdown occurs within the first nine years of the Project, after which overall water levels stabilize, with annual fluctuations of approximately two feet in response to the continued pumping cycle, which also accounts for annual recharge. Approximately 90% of the drawdown would occur during the first three years of pumping, after which drawdown gradually continues to increase until maximum drawdown is reached at approximately year nine. Once project-specific pumping stops in year 25, water levels would recover to pre-project conditions as an inverse to the above, with 90 percent recovery expected within the first three years after pumping discontinues (HECA AFC).

The above modeling results are consistent with what the District has observed for high-yield agricultural wells in the Buttonwillow Service Area. Typical pumping rates in agricultural wells within the District range from 1,500 to 2,000 gpm. According to the HECA AFC, Sierra Scientific Services indicated that there has been very little pumping impact (i.e., minimal drawdown) in local agricultural wells in the vicinity of the five proposed Target Area B wells shown on Figure 10, and that this response is similar to nearby Kern County areas that have already been studied in detail. Therefore, implementation of the BGRP will not result in adverse impacts relating to groundwater drawdown effects.

d. Groundwater Balance

The District's overall groundwater balance includes an average net surplus of approximately 46,000 AF/yr, above consumptive use demands. Implementation of the BGRP includes the extraction of up to 12,000 AF/yr of brackish groundwater, the bulk of which (approximately 7,500 AF/yr) may be conveyed to the HECA power plant through the HECA pipeline, in the event that HEI participates in the BGRP. Remaining quantities may be extracted using Target Area A wells, Target Area B wells, existing District-owned or landowner wells, or other methods described herein or developed during the environmental review and planning process.

Water extracted pursuant to the BGRP is replaced by additional lateral recharge water, particularly brackish groundwater lateral recharge from the west, and is further offset by the District's groundwater recharge and positive groundwater balance. Therefore, implementation of the BGRP will not result in a net deficit in aquifer storage volume within the District or surrounding areas.

The BGRP is not expected to result in adverse impacts upon hydrology or water quality. Mitigation included in *Mitigation Measure* below is intended to avoid or reduce to levels less than significant any unforeseen impacts upon hydrology and water quality.

Summary

For the reasons discussed above, the Program is not expected to result in a significant adverse impact upon hydrology or water quality; however, mitigation intended to avoid or reduce unforeseen adverse impacts upon hydrology or water quality to levels less than significant is included herein.

Mitigation Measure

Although no adverse impacts upon hydrology and water quality are expected to result from implementation of the Program, mitigation is incorporated into the Program in order to mitigate any unforeseen impacts upon hydrology and water quality.

HYDRO-1: Groundwater Monitoring Plan and MOU

During implementation of the Program, the District will conduct all Program operations in accordance with the Buena Vista Water Storage District Groundwater Monitoring Plan (Groundwater Monitoring Plan) and Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (MOU). Copies of the Groundwater Monitoring Plan and the MOU are included in Appendices B and C of the Program EIR.

J. LAND USE AND PLANNING

According to the Kern County General Plan, land use designations within the Buttonwillow Service Area are primarily Intensive Agriculture and Extensive Agriculture. Said land use designations are defined below, as excerpted from the Kern County General Plan (2004).

Map Code 8.1 (Intensive Agriculture) – *Areas devoted to the production of irrigated crops or having a potential for such use. Other agricultural uses, while not directly dependent on irrigation for production, may also be consistent with the intensive agriculture designation. Minimum parcel size is twenty acres gross.*

Uses shall include, but are not limited to, the following: Irrigated cropland; orchards; vineyards; horse ranches; raising of nursery stock ornamental flowers and Christmas trees; fish farms, bee keeping ranch and farm facilities and related uses; one single-family dwelling unit; cattle feed yards; dairies; dry land farming; livestock grazing; water storage; groundwater recharge acres; mineral, aggregate, and petroleum exploration and extraction; hunting clubs; wildlife preserves; farm labor housing; public utility uses; agricultural industries pursuant to provisions of the Kern County Zoning Ordinance; and land within development areas subject to significant physical constraints.

Map Code 8.3 (Extensive Agriculture) – *Agricultural uses involving large amounts of land with relatively low value-per-acre yields, such as livestock grazing, dry land farming, and woodlands. Minimum parcel size is twenty acres gross, except lands subject to a Williamson Act Contract/Farmland Security Zone Contract, in which case the minimum parcel size shall be 80 acres gross.*

Uses shall include, but are not limited to, the following: Livestock grazing; dry land farming; ranching facilities; wildlife and botanical preserves; timber harvesting; one single-family dwelling unit; irrigated croplands; water storage or groundwater recharge areas; mineral, aggregate, and petroleum exploration and extraction; recreational activities, such as gun clubs and guest ranches; and land within development areas subject to significant physical constraints.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Construction and operation of facilities pursuant to the GRRP will convert a total land area of approximately 3.9 acres of Farmland to non-agricultural use (see *Agriculture Resources* above). The GRRP wells and pipelines, with the exception of the aboveground portions of the well facilities and access features, will be located belowground and do not have the potential to divide an existing community or result in significant adverse impacts upon land use.

Conversion of 3.9 acres of Farmland constitutes approximately 0.011% of the total area of 36,600 acres designated Prime Farmland within the Buttonwillow Service Area, and constitutes approximately 0.0089% of the total area of 44,000 acres designated Farmland within the Buttonwillow Service Area. The conversion of this relatively small area of Farmland will not significantly impact Farmland or land use. Therefore, implementation of the GRRP will not result in adverse impacts upon land use and will not conflict with existing land use plans, policies, or regulations.

2. Component 2: Water Exchange Project (WEP)

The WEP includes exchanging water with other entities in order to better match the District's dry-year demands, and does not include construction of any facilities. The WEP will not conflict with existing land use plans, policies, or regulations and will not result in adverse impacts upon land use.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP includes acquiring and managing water service rights from lands that have been encumbered by conservation easements and have transitioned away from full agricultural use. The CEWAMP will not convert, or facilitate conversion of, any existing land uses to other land uses. The CEWAMP will not conflict with existing land use plans, policies, or regulations and will not result in adverse impacts upon land use.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Construction and operation of the Target Area A wells is anticipated to convert approximately 9.2 acres of Farmland to non-agricultural use. Construction and operation of the ten Target Area B wells will convert an area of approximately 23 acres of land classified as Farmland to non-agricultural use.

Combined, the area of Farmland anticipated for conversion to non-agricultural use by implementation of the BGRP totals 11.5 acres, which constitutes approximately 0.031% of the 36,600 acres of Prime Farmland and approximately 0.026% of the 44,000 acres of

total Farmland within the Buttonwillow Service Area. The conversion of this small area of Farmland will not significantly impact Farmland or land use; therefore, implementation of the BGRP will not result in adverse impacts upon land use and will not conflict with existing land use plans, policies, or regulations.

The HECA pipeline consists of belowground facilities that will be constructed within the District's existing unpaved service road along the eastern bank of the West Side Canal; therefore, construction and operation of said the HECA pipeline will not result in the conversion of any land use. The HECA pipeline will not adversely impact land use and will not conflict with existing land use plans, policies, or regulations.

Summary

As described above, the GRRP and BGRP will each result in insignificant impacts upon land use (Farmland). The total area of Farmland expected to be converted to non-agricultural use by implementation of the GRRP and the BGRP combined is approximately 15.4 acres, which constitutes approximately 0.042% of Prime Farmland and approximately 0.035% of total Farmland within the Buttonwillow Service Area. The conversion of this small area of Farmland will not result in adverse impacts upon Farmland, land use, or planning.

For the reasons stated above, the Program will not result in significant adverse impacts upon land use or planning; therefore, mitigation measures to avoid or reduce potential impacts upon land use or planning to a level less than significant are not needed.

K. MINERAL RESOURCES

According to the Kern County General Plan (2004), mineral resources are an important commodity within Kern County. Borax, cement production, and construction aggregates constitute the major economic mineral resources within the County. The County's land use designation related to mineral resources is defined below.

Map Code 8.4 (Mineral and Petroleum) – *Areas which contain producing or potentially productive petroleum fields, natural gas, geothermal resources, and mineral deposits of regional and statewide significance. Uses are limited to activities directly associated with the resource extraction. Minimum parcel size is five acres gross.*

Uses shall include, but are not limited to the following: Mineral and petroleum exploration and extraction, including aggregate extraction; extensive and intensive agriculture; mineral and petroleum processing (excluding petroleum refining); natural gas and geothermal resources; pipelines; power transmission facilities; communication facilities; equipment storage yards; and borrow pits.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Locations of facilities pursuant to the GRRP have not yet been selected; however, they will be located on existing Farmland or on land otherwise previously disturbed. Approximately 96% of land area within the Buttonwillow Service Area is designated as Farmland, and there are no known mineral resources or mineral resource recovery sites within the Buttonwillow Service Area. Therefore, implementation of the GRRP will not result in adverse impacts upon mineral resources.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities, nor does it include features or activities that would result in adverse impacts upon mineral resources. The WEP will not result in adverse impacts upon mineral resources; therefore, mitigation measures are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities, nor does it include features or activities that would result in adverse impacts upon mineral resources. The CEWAMP will not result in adverse impacts upon mineral resources; therefore, mitigation measures are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Locations of facilities pursuant to the BGRP have not yet been selected; however, they will be located on existing Farmland or on other previously disturbed land. If HEI participates, the HECA pipeline will be constructed within the District's unpaved service road along the eastern bank of the West Side Canal. For these reasons, implementation of the BGRP will not result in adverse impacts upon mineral resources, and mitigation measures are not needed.

Summary

Approximately 96% of land area within the Buttonwillow Service Area is classified as Farmland, and there are no known mineral resources or mineral resource recovery sites within the Buttonwillow Service Area. The WEP and CEWAMP components of the Program do not include construction of facilities, and therefore, do not have the potential to impact mineral resources or mineral resource recovery sites.

Facilities proposed pursuant to the GRRP and BGRP will be located on existing Farmland or on other land that has been previously disturbed. For the reasons stated above, the Program will not result in a significant impact upon mineral resources, and mitigation measures designed to avoid or reduce adverse impacts upon mineral resources to levels less than significant are not needed.

L. NOISE

The National Institute for Occupational Safety and Health document, Criteria for a Recommended Standard, Occupational Noise Exposure (NIOSH Publication No. 98-126, June 1998), defines noise as "essentially any unwanted or undesirable sound".

The Noise Element of the Kern County General Plan (2007) has identified the following noise-sensitive land uses within the County: residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches. The following goals pertaining to noise are set forth in the Noise Element of the Kern County General Plan (2007).

Goals

- Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

- Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources.

Noise control provisions are set forth in *Chapter 8.36 Noise Control* of the Ordinance Code of Kern County. Implementation of the Program is anticipated to result in two types of noise generation, which are (1) construction noise and (2) operation and maintenance noise. Construction noise is noise that is generated by construction activities, is temporary, and is generally less than significant. Operation and maintenance noise is that which is generated during ongoing operation and maintenance activities. Operation and maintenance noise is long-term, may be continuous or intermittent, and the significance of resulting impacts is based upon the source's proximity to sensitive receptors, as well as the intensity of the noise.

Construction of facilities pursuant to the GRRP and BGRP will generate construction noise that will cease upon completion of construction. Facilities proposed pursuant to the GRRP and BGRP will generate noise during ongoing operation and maintenance of said facilities. Potential impacts relating to noise are discussed below for each component of the Program.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Construction, development, and testing of facilities proposed pursuant to the GRRP will result in temporary noise from construction equipment and vehicles; however, this noise will cease upon completion of construction and testing of GRRP facilities.

Operation of the GRRP wells, and increased operation of existing District-owned or landowner wells, will result in an incremental increase in ambient noise resulting from operation of the well pumps. Wells constructed pursuant to the GRRP will be sited on land that is currently, or has been recently, used for agriculture, or has been otherwise disturbed. Wells will not be sited in close proximity to an occupied residence or other sensitive land use.

Maintenance activities will result in once-daily trips by BVWSD maintenance staff to each GRRP well facility for regular maintenance activities. These daily trips will generate traffic noise; however, the quantity of additional traffic will be minimal (approximately one trip daily to each well), and the resulting noise impacts are considered less than significant.

For the reasons stated above, implementation of the GRRP will not result in significant adverse impacts related to noise.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of any facilities, the increased operation of existing facilities, or any features or activities that would generate substantial noise; therefore, implementation of the WEP will not result in adverse impacts related to noise.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of any facilities, the increased operation of existing facilities, or any features or activities that would generate substantial noise; therefore, implementation of the CEWAMP will not result in adverse impacts related to noise.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Construction, operation, and maintenance activities pursuant to the BGRP will generate noise. Noise generated during construction of these facilities includes that generated by construction equipment and construction worker vehicle traffic. Said noise will be temporary and will not persist beyond completion of construction.

The HECA pipeline, which will be included in the BGRP if HEI participates, is anticipated to generate noise during construction and maintenance activities. Said pipeline will be located belowground and will not generate perceptible noise levels during operation. Noise generated during construction of the HECA pipeline consists of construction equipment and

construction worker vehicle traffic, will be temporary, and will cease upon completion of construction. Noise generated during maintenance activities for the HECA pipeline includes traffic noise generated by maintenance vehicle trips, which are anticipated to occur once daily along the HECA pipeline alignment. Noise generated by traffic at this anticipated frequency will not result in a significant impact related to noise.

Noise generated during operation of the Target Area A wells and Target Area B wells, that generated by and increased operation of District-owned or landowner wells, includes noise generated by operation of the well pumps. Proximity of said wells to sensitive land uses precludes any adverse impacts resulting from operational noise. Wells constructed pursuant to the BGRP are anticipated to be located on existing Farmland or other previously disturbed land and will not be sited in close proximity to any occupied residences or other sensitive land uses.

Noise generated during maintenance of wells pursuant to the BGRP includes that generated by approximately one vehicle trip daily to each well site. Since five of the proposed Target Area B wells are preliminarily located relatively close together, each well can be visited for maintenance with one trip to the well field. The incremental increase in vehicle trips resulting from maintenance of the Target Area A wells, the Target Area B wells, and the HECA pipeline will not result in a significant impact related to noise.

Summary

For the reasons stated above, temporary impacts related to noise will be less than significant. Further, permanent incremental increases in ambient noise levels resulting from operation and maintenance of Program facilities will be less than significant; therefore, mitigation measures to avoid or reduce impacts related to noise are not needed.

M. POPULATION AND HOUSING

Components 1 through 4 (GRRP, WEP, CEWAMP, BGRP)

The Program will have no direct impact on population growth or housing demand within the area. Implementation of the Program will not require a substantial increase in the number of District

staff. Program participants may have population impacts in areas local to their facilities. Any potential population or housing impacts resulting from Program participants associated with their participation in the Program will be evaluated by said participants in separate environmental analyses.

No impacts upon population and housing are anticipated to result from implementation of the Program; therefore, mitigation measures to avoid or reduce impacts related to population and housing are not needed.

N. PUBLIC SERVICES

Components 1 through 4 (GRRP, WEP, CEWAMP, BGRP)

The Program does not include any features or facilities that are intended for human occupancy or that will require any additional public services, such as fire protection or police services. The Program does not have the potential to alter the demand for schools, parks, or other public facilities. For these reasons, the Program will not adversely impact any public services, and mitigation measures to avoid or reduce impacts upon public services are not needed.

O. RECREATION

Components 1 through 4 (GRRP, WEP, CEWAMP, BGRP)

The Program does not include any features or facilities that would increase or decrease the Program area's population; therefore, the Program will not result in increased or decreased use of parks or other recreational facilities. The Program will not impact any existing recreational facilities or require the construction or expansion of recreational facilities. For the reasons stated above, no impacts upon recreation are anticipated to result from implementation of the Program; therefore, mitigation measures to avoid or reduce impacts upon recreation are not needed.

P. TRANSPORTATION AND TRAFFIC

Impacts on transportation and traffic resulting from the Program will be minimal and will not modify the level of service on any road or highway. Potential Program impacts on transportation and traffic are described below for each component.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

Construction traffic anticipated during construction of facilities pursuant to the GRRP includes construction vehicles and equipment and construction workers' vehicles used to commute to the construction sites. Increases in traffic during construction of facilities pursuant to the GRRP will be less than significant and temporary.

Traffic anticipated to be generated during operation and maintenance of the GRRP facilities includes one trip daily by BVWSD maintenance staff to each GRRP well site. These additional vehicle trips for maintenance will not result in a significant increase in traffic and will not result in an adverse impact upon transportation or traffic. Therefore, mitigation measures to avoid or reduce impacts upon transportation or traffic are not needed.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities or any features or activities that would impact transportation or traffic; therefore, mitigation measures to avoid or reduce impacts upon transportation or traffic are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities or any features or activities that would impact transportation or traffic; therefore, mitigation measures to avoid or reduce impacts upon transportation or traffic are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

Traffic anticipated during construction of facilities pursuant to the BGRP includes construction vehicles and equipment and workers' vehicles used to commute to the construction sites. Said construction traffic will be temporary and will cease upon completion of construction.

Traffic anticipated to be generated during operation and maintenance of facilities pursuant to the BGRP will include an estimated one trip daily by BVWSD staff to each facility for maintenance. Total trips anticipated for operation and maintenance of BGRP facilities are approximately 51 daily trips (up to 50 wells plus one pipeline). Five of the proposed Target Area B wells are preliminarily proposed to be constructed within the same general area; therefore, vehicle trips to all these wells may be conducted within one trip to the well field. The approximately 51 additional daily trips within the Buttonwillow Service Area would not modify the level of service on any road in the area and would result in a minimal impact upon transportation or traffic. Therefore, mitigation measures to avoid or reduce potential impacts upon transportation or traffic are not needed.

Summary

As described above, increases in vehicle trips due to construction of Program facilities will be less than significant and will be temporary. Traffic anticipated during operation and maintenance of Program facilities will be minimal and less than significant; therefore, mitigation measures designed to avoid or reduce potential impacts upon transportation and traffic are not needed.

Q. UTILITIES AND SERVICE SYSTEMS

As described below, the Program will not result in adverse impacts upon utilities and service systems.

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The GRRP may generate small quantities of solid waste during construction activities; however, said quantities of solid waste will be minimal and will be accommodated by a local landfill. The GRRP will not generate sanitary wastewater and will not adversely impact any utilities or service systems. Therefore, mitigation measures to avoid or reduce adverse impacts upon utilities and service systems are not needed.

2. Component 2: Water Exchange Project (WEP)

The WEP does not include construction of facilities, nor does it include any activities or features that would generate solid waste or impact utilities or service systems. Therefore, implementation of the WEP will not result in adverse impacts upon utilities or service systems and mitigation measures are not needed.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP does not include construction of facilities, nor does it include any activities or features that would generate solid waste or impact utilities or service systems. The CEWAMP includes acquiring water service rights from owners of a portion of the Northern Area Lands of the Buttonwillow Service Area that have entered, or will enter, into conservation easement agreements and have transitioned away from full agricultural use. Said acquired water service rights will be managed in accordance with the conditions of any applicable conservation easements. No new or expanded entitlements are needed as a result of the Program. Implementation of the CEWAMP will not result in adverse impacts upon utilities or service systems and mitigation measures are not needed.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

The water uses involved in the BGRP component of the Program are intended to operate in conjunction with recipient facilities, such as the HECA power plant (in the event that HEI participates in the BGRP), that will receive the resultant brackish groundwater and that are owned and operated by others. Extraction of brackish groundwater will only be performed when compatible recipient facilities are in place and are prepared to accept such water. Construction of facilities pursuant to the BGRP may generate small quantities of solid waste during construction activities; however, said quantities of solid waste will be minimal and will be accommodated by a local landfill. Implementation of the BGRP will not adversely impact utilities or service systems; therefore, mitigation measures are not needed.

Summary

For the reasons stated above, the Program will not adversely impact any utilities or service systems in the Program area; therefore, mitigation measures to avoid or reduce adverse impacts upon utilities or service systems are not needed.

SECTION VI

SIGNIFICANT IRREVERSIBLE CHANGES

SECTION VI
SIGNIFICANT IRREVERSIBLE CHANGES

Irreversible changes that are expected to result from implementation of the Program consist of the permanent conversion of Farmland (as designated by the Farmland Mapping and Monitoring Program; see *Agriculture Resources* in Section V herein), to non-agricultural use. As described in Section V, areas of Farmland anticipated to be converted to non-agricultural use equate to approximately 15.4 acres. These 15.4 acres represent approximately 0.042% of the approximately 36,600 acres of the prime Farmland within the Buttonwillow Service Area and approximately 0.035% of the approximately 44,000 acres of total Farmland within the Buttonwillow Service Area. Conversion of this relatively small percentage of Farmland is considered less than significant; therefore, the Program will not result in any significant irreversible changes.

SECTION VII

ECONOMIC AND SOCIAL EFFECTS

SECTION VII
ECONOMIC AND SOCIAL EFFECTS

1. Component 1: Groundwater Recharge and Recovery Project (GRRP)

The GRRP includes the extraction of up to 20,000 AF/yr of previously recharged groundwater. Groundwater extraction will be conducted using existing District-owned wells, existing landowner wells, up to seventeen proposed GRRP wells, the use of landowner wells facilitated by reductions in surface water supply allocations, the use of individual volunteer landowner wells pursuant to agreements with the District, other methods developed during the environmental review and planning process, or a combination of these.

Use of landowner wells will result in less irrigation water delivered by canals, and more irrigation water pumped from wells. Additional power costs incurred by landowners within BVWSD resulting from increased groundwater pumping will be offset by reductions in or rebates of District landowner assessments, by the improvement of services provided by the District to landowners, or both.

2. Component 2: Water Exchange Project (WEP)

The WEP component involves the use and management of surface water. The surface water that would be included in the WEP includes Kern River water that has been allocated to the District under the terms of the Miller-Haggin Agreement, as amended. High-flow Kern River water that is available to the District during wet years is not necessary for the immediate uses and purposes of the land and landowners within the District. The State Water Resources Control Board has previously found and confirmed that no additional water in the Kern River system remains available for appropriation, although a recent court ruling has determined that a forfeiture of water rights has occurred (by a party other than BVWSD). BVWSD was not a party to the litigation and such determination should not affect BVWSD's water rights. Further, the existing rights and entitlements of other water users will not be affected by implementation of the WEP.

3. Component 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The CEWAMP includes acquiring and managing the water service rights of certain areas within the Northern Area Lands. Acquisition of said water service rights may include purchasing said rights from the landowners, waiving assessments charged to said landowners by the District, option agreements, or purchasing or leasing land that would then be allowed to lie fallow.

The District will manage the resulting water service rights with in-District entities, out-of-District entities, or a combination of these. Net economic benefits derived by the District will be used to fund new water infrastructure, increase groundwater recharge, improve services to District customers, stabilize and reduce costs to District customers, or a combination of these.

4. Component 4: Brackish Groundwater Remediation Project (BGRP)

The BGRP includes the extraction and conveyance of up to 12,000 AF/yr of brackish groundwater, of which approximately 7,500 AF/yr may be conveyed to HEI's proposed HECA power plant (if HEI participates in the BGRP). Remaining quantities may be extracted from Target Area A wells, Target Area B wells, landowner wells, District-owned wells, or by other methods set forth herein or developed during the environmental review and planning process. Net District proceeds resulting from implementation of the BGRP will be used to fund new water infrastructure, increase groundwater recharge, improve services to District customers, stabilize and reduce costs to District customers, or a combination of these.

Increased groundwater pumping associated with the BGRP may result in lowering groundwater levels within the vicinity of the pumping Target Area B wells. According to the hydrology analysis included in the HECA AFC and discussed in V(I)(4) herein, impacts upon groundwater levels resulting from operation of five of the proposed Target Area B wells (as depicted in Figure 10) will not be significant.

The Target Area A wells are intended to improve conditions for agriculture within areas of the northern portion of the Buttonwillow Service Area by lowering shallow perched brackish groundwater levels that adversely impact plant growth and result in decreased crop yields. Therefore, operation of Target Area A wells will likely result in a positive economic or social impact in affected agricultural areas.

For the reasons stated above, the BGRP will not result in adverse economic or social impacts upon surrounding groundwater users.

SECTION VIII

GROWTH-INDUCING IMPACTS

SECTION VIII
GROWTH-INDUCING IMPACTS

Implementation of the Program will not require an increase in the number of District employees. Potential growth-inducing impacts that may result from Program participants (potentially HEI and possible others) in association with their participation in the Program will be addressed by said participants as part of separate environmental analyses in compliance with CEQA.

Employees needed for construction of facilities pursuant to the Program will be provided by local contractors. Growth-inducing impacts anticipated as part of operation and maintenance of the HECA power plant are anticipated to be less than significant according to the HECA AFC and will be addressed by the lead agency (CEC).

For the reasons stated above, implementation of the Program will not result in any growth-inducing impacts.

SECTION IX

CUMULATIVE IMPACTS

SECTION IX
CUMULATIVE IMPACTS

Section 15130 of the State CEQA Guidelines states that "an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in Section 15065 (a)(3)." Section 15065 (a)(3) states that " 'cumulatively considerable' means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of possible future projects."

With the prevalence of Farmland throughout BVWSD's Service Area, there has historically been very little non-agricultural development within said Service Area. The District is aware of three proposed projects within the Buttonwillow Service Area: (1) the HECA power plant project and its associated facilities, (2) a nearby proposed dairy operation (Palm Ranch Dairy), and (3) a District project consisting of constructing a new turnout from the California Aqueduct to the West Side Canal (BV8 Project).

According to the Kern County Planning Department, the Palm Ranch Dairy involves establishing a dairy farm in the vicinity of the intersection of Adohr Road and Dairy Road. At this time, very little information about Palm Ranch Dairy is available, and environmental documents for the dairy are anticipated to be available sometime in 2010.

Construction of the District's proposed BV8 Project (currently under separate environmental review) is not expected to result in any significant environmental impacts or any impacts that would be cumulatively considerable when considered in combination with the Program, HECA power Plant, or Palm Ranch Dairy. Therefore, the new turnout project will not be discussed further in this document.

For the reasons stated above, this section will evaluate Program impacts that may be cumulatively considerable when viewed in connection with impacts that may result from the HECA power plant project. HEI's participation in the BGRP would require five brackish groundwater extraction wells (five of the proposed Target Area B wells) and a brackish water conveyance pipeline (HECA pipeline) extending from the HECA wells to the HECA power plant to provide brackish groundwater for use as process water at the HECA power plant. It is anticipated that the five Target Area B wells serving the HECA power plant would be located along or near the service road adjacent to the West Side Canal in order to maximize the use of existing access roads and to minimize disturbance of existing Farmland and surrounding areas.

Based upon the environmental impacts analysis set forth in Section V, the District has determined that potential impacts relating to air quality, biological resources, and hydrology and water quality warrant discussion of potential cumulative impacts in consideration of the proposed HECA power plant.

A. AIR QUALITY AND CLIMATE CHANGE

Air pollutant emissions anticipated to result from the Program include those generated by construction, operation, and maintenance of facilities pursuant to the GRRP and the BGRP, as discussed in Section V(C) herein. Regulated air pollutant emissions expected to result from construction of facilities pursuant to the GRRP and BGRP will remain below established peak daily construction thresholds. Air pollutant emissions remaining below said daily thresholds are considered less than significant.

The quantities of regulated air pollutant emissions that will be generated during construction, operation, and maintenance of the HECA power plant are not known at this time. Since estimated quantities of regulated air pollutant emissions expected to be generated by construction of Program facilities are less than significant and temporary, the District has determined that no cumulatively considerable impacts related to regulated air pollutant emissions will result from implementation of the Program.

Further, emissions generated by construction activities pursuant to the Program will be temporary and will cease upon completion of construction. Therefore, regulated air pollutants generated by implementation of the Program will not result in cumulatively considerable impacts.

As set forth in Section V(C) herein, GHG emissions expected to result from implementation of the Program total approximately 12,750 metric tons CO_2Eq/year. Existing GHG emissions generated by the District and by groundwater wells operating within the Buttonwillow Service Area are estimated to be approximately 5,721 metric tons CO_2Eq/year. Program GHG emissions combined with existing District GHG emissions total approximately 18,471 metric tons CO_2Eq/year. In the absence of an established significance threshold for GHGs, the District uses the reporting threshold of 25,000 metric tons CO_2Eq/year that has been proposed by CARB, as discussed in Section V(C) herein. Therefore, GHG emissions generated by the Program are not considered significant.

Quantities of GHGs that would be emitted by the proposed HECA power plant project are not known at this time. The proposed GHG reporting threshold is intended to apply per facility or per project, and the increase in annual GHG emissions estimated to be generated by implementation of the Program is below said threshold and is considered less than significant. For these reasons, the District has determined that implementation of the Program will not result in cumulatively considerable impacts upon air quality or climate change.

B. BIOLOGICAL RESOURCES

Agricultural development in the area, as well as the development of the canal system within the Buttonwillow Service Area, has contributed to the fragmentation of habitat supporting biological resources in the region. Impacts of the Program upon biological resources have the potential to be cumulatively considerable if not fully mitigated.

Potential impacts upon biological resources resulting from the HECA power plant project have been preliminarily addressed in the HECA AFC, which also proposes mitigation measures to avoid or reduce adverse impacts upon biological resources resulting from the HECA power plant to a level less than significant.

Adverse impacts upon biological resources expected to result from implementation of the Program are discussed in subsection V(D) herein. Said impacts will be avoided or reduced to below a level of significance by implementation of mitigation measures BIO-1 through BIO-3 as set forth in Subsection V(D) and Section X herein.

For the reasons stated above, the District has determined that the Program will not result in cumulatively considerable impacts upon biological resources.

C. HYDROLOGY AND WATER QUALITY

Effects upon surface water quality due to water and wind erosion that may result from construction of facilities pursuant to the Program could be potentially significant without implementation of standard construction BMPs and the mitigation measures set forth herein.

Impacts related to hydrology and water quality that may result from implementation of the HECA power plant project have been preliminarily addressed in the HECA AFC. Said impacts are expected to be insignificant with incorporation of mitigation measures proposed in the HECA AFC.

The GRRP is not expected to result in significant impacts upon groundwater levels in the area. Groundwater that will be extracted is that which has been previously recharged, thus preventing an overdraft condition from resulting. Further, implementation of the GRRP is expected to be basin-positive (refer to Appendix G).

Potential impacts are further offset by the District's positive groundwater balance, as well as by the District's groundwater recharge efforts. Further, potential impacts upon water quality that may result from construction of facilities pursuant to the GRRP will be mitigated to below a level of significance by incorporation of standard construction BMPs and mitigation measures SOIL-1 through SOIL-3 and WATER-1, as set forth in Sections V and X herein.

Implementation of the WEP is not expected to result in adverse impacts upon hydrology or water quality. Construction of facilities by the District is not included in the WEP, and water that will be exchanged is that which is not immediately necessary for the uses and purposes of the District, but will be utilized in exchange(s) in order to balance the District's supplies with its dry-year demands.

Implementation of the CEWAMP does not include construction of facilities by the District and is not expected to result in adverse impacts upon hydrology or water quality. Water included in the CEWAMP does not include quantities of water that has been designated for use in wildlife conservation or restoration. Implementation of the CEWAMP will comply with all applicable requirements of any conservation easements.

Extraction of brackish groundwater pursuant to the BGRP is not expected to result in significant adverse impacts upon groundwater levels. Water that will be extracted is expected to have TDS concentrations in excess of the secondary MCL of 1,000 mg/L and is not very suitable for use as drinking water, irrigation water, or most other uses within the local area. Extraction of the brackish groundwater will be offset by continuous lateral recharge with brackish water from aquifers to the west of the Buttonwillow Service Area, by lateral recharge with lower-TDS waters from aquifers to the east, by the District's positive groundwater balance, and by the District's groundwater recharge efforts. Extraction of shallow perched brackish groundwater by the Target Area A wells is intended to lower the shallow perched groundwater level and is not expected to impact other aquifers, such as the deeper aquifer zone.

The bulk of the brackish groundwater proposed for extraction pursuant to the BGRP may be used as process water for the HECA power plant, if HEI participates in the BGRP. In this case, potential impacts of said quantities of brackish groundwater overlap with those of the process water proposed for use by the HECA power plant, and the potential impacts of each are less than significant. For these reasons, adverse impacts upon groundwater resources pursuant to the BGRP are not expected to be cumulatively considerable.

SECTION X

MITIGATION MEASURES PROPOSED TO AVOID OR MINIMIZE POTENTIAL SIGNIFICANT EFFECTS

SECTION X
MITIGATION MEASURES PROPOSED TO AVOID OR MINIMIZE POTENTIAL SIGNIFICANT EFFECTS

Adverse impacts anticipated to result from implementation of the Program are related to biological resources, historical and archaeological resources, paleontological resources, and soils/water quality. Said potential impacts are discussed in detail in Section V and will be avoided or reduced to a level less than significant by incorporation of the mitigation measures set forth in Section V and listed below.

A. BIOLOGICAL RESOURCES

1. BIO-1: Rare Plant and Sensitive Wildlife Survey

Prior to construction of GRRP or BGRP facilities, a survey for rare plants and sensitive wildlife will be conducted in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas.

2. BIO-2: Nesting Bird Survey

If construction of GRRP or BGRP facilities will commence during breeding season (March 1 to July 31), a pre-construction survey for nesting birds will be conducted in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas. If a native bird nest is found in the work area, construction will be delayed within a radius from the nest as recommended by the biologist until the nest has either fledged young or failed.

3. BIO-3: Rare Plant or Wildlife Avoidance

If rare plants or sensitive wildlife species are found in (1) affected project and access route areas and (2) adjacent areas within 100 feet of the affected areas, the GRRP or BGRP facilities will be relocated within the well field site to avoid such species, if possible. If the facilities cannot be relocated, consultation with the appropriate resource agencies, such as the California Department of Fish and Game and/or the U.S. Fish and Wildlife Service will be conducted.

B. ARCHAEOLOGICAL AND HISTORICAL RESOURCES

1. CUL-1: Retain a Qualified Professional Archaeologist

Prior to commencing construction of facilities pursuant to the Program, a qualified professional archaeologist will be retained as the cultural resources specialist (CRS) who will be responsible for implementation of Mitigation Measures CUL-2 through CUL-8.

2. CUL-2: Inventory the Program's Area of Potential Effects (APE) for Cultural Resources

As the specific locations of Program facilities have yet to be determined, and as no cultural resources inventory efforts have been conducted within the majority of the Program vicinity, an inventory of cultural resources is necessary.

Once the design of Program facilities has been developed, the CRS will identify the Program's Area of Potential Effects (APE) based on this design. Once the APE has been determined, requests for information from the California Native American Heritage Commission (NAHC) and appropriate office of the California Historical Resources Information System (CHRIS) will be made. Following these efforts, requests for information from the Native American groups and individuals identified by the NAHC will be made. Although such contact efforts were conducted for the HECA power plant project, they were for that project footprint (including the HECA pipeline) and were not focused on the Program.

Following the consultations listed above, the APE will be subject to an intensive archaeological pedestrian reconnaissance. The entire APE will be surveyed using parallel transects of no greater then twenty meters by a team of qualified professional archaeologists. All identified archaeological resources will be recorded using the appropriate California Department of Parks and Recreation (DPR) Archaeological Site Recordation Forms.

The results of the inventory efforts, including Native American consultation, will be documented in a Confidential Archaeological Technical Report.

3. CUL-3: Avoidance

Prior to commencement of construction, a records search of each site planned for construction of facilities pursuant to the Program will be conducted. Because avoidance is the preferred treatment of archaeological and historical resources, sites identified as containing cultural resources within the vicinity of facilities proposed pursuant to the Program will be avoided where feasible. Furthermore, if a potentially significant cultural resource is discovered during construction, the construction plans will be modified, if possible, to avoid that resource. If there are no feasible means for avoiding the resource, then the cultural resource will be tested. If the cultural resource is found to be significant, the measures described below will be implemented in consultation with BVWSD and Program participants and associated CEQA lead agencies, as applicable.

For any important or potentially important cultural resource that can be avoided by modification of project plans, the cultural resource will be temporarily fenced or otherwise demarcated on the ground, and the area will be designated environmentally sensitive. Construction equipment will be directed away from the cultural resource, and construction personnel will be directed to avoid entering the area. Where cultural resource boundaries are unknown, the protected area will include a buffer zone with a 100-foot radius. In some cases, additional archaeological work could be required to demarcate the boundaries of the cultural resource to ascertain and assure avoidance.

4. CUL-4: Testing

The CRS will prepare and submit to BVWSD, and appropriate participants and CEQA lead agencies, as applicable, an archaeological testing plan (ATP) for review and approval. All archaeological testing will be conducted in accordance with the approved ATP. The ATP will identify the property types of the expected archaeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the ATP is to determine, to the extent possible, the presence or absence of archaeological or historical resources; to identify any archaeological or historical resources found; and to evaluate the historical significance of any archaeological or historical resources found.

Upon completion of the archaeological testing, the CRS will submit a written report of the findings to BVWSD and appropriate participants and lead agencies, as applicable. If the CRS finds that significant archaeological resources may be present based on the ATP, then BVWSD (and participants and lead agencies, as applicable), in consultation with the CRS, will determine if additional measures are warranted. Additional measures that may be undertaken include additional archaeological testing, archaeological monitoring, an archaeological data recovery program, or a combination of these. If the CRS determines that a significant cultural resource is present, and that the resource could be adversely affected by the proposed project, then BVWSD or appropriate participants and lead agencies, as applicable, at their discretion and in consultation with the CRS, will either:

- Redesign all or part of the proposed Program facilities, as practicable, to avoid any adverse effect on the important cultural resource; or

- Implement a data recovery program.

If the cultural resource being subject to archaeological testing is associated with the Native American inhabitation of the region, the District (or appropriate lead agency) may request that a Native American monitor be present during the implementation of this mitigation measure.

5. CUL-5: Data Recovery

Data recovery shall be implemented in the event that an adverse impact to an important archaeological or historical resource cannot be avoided. The archaeological data recovery program shall be conducted in accordance with an archaeological data recovery plan (ADRP). The CRS(s), Program participant(s) and BVWSD (and/or appropriate lead agency) will meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The CRS will submit a draft ADRP to the District. The ADRP will identify how the proposed data recovery program will preserve the significant information that the cultural resource is expected to contain. That is, the ADRP will identify what scientific or historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable resource questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the Program. Destructive data recovery methods will not be applied to archaeological resources, or portions of resources, if nondestructive methods are practical. If the cultural resource being subject to data recovery is associated with the Native American inhabitation of the region, the District (and/or appropriate lead agency) may request that a Native American monitor be present during implementation of this mitigation measure.

6. CUL-6: Construction Monitoring

Given the archaeological sensitivity of the Program vicinity, an archaeological monitoring program will be implemented. A Cultural Resources Monitor (CRM) will be appointed and will be responsible for keeping a daily monitoring log of construction activities, observations, types of equipment used, problems encountered, and any new archaeological discovery (including the cultural material observed and its location). Photographs will be taken as necessary to supplement the documentation. These logs will be signed and dated by the CRM and included within the monitoring report. It may be necessary that multiple CRMs be appointed given the geographical extent of facilities pursuant to the Program.

The archaeological monitoring program will include the following provisions, at a minimum:

- The CRS, in consultation with BVWSD (and/or appropriate lead agency), will determine what activities will be archaeologically monitored. In most cases, any soil-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., will require archaeological monitoring because of the risk these activities pose to potential archaeological resources and to their depositional context;

- BVWSD (and/or appropriate CEQA lead agency) and the CRS will advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource;

- The CRM(s) will be present on construction sites pursuant to the Program until BVWSD (and/or appropriate CEQA lead agency) has, in consultation with the CRS, determined that related construction activities could have no effect on significant archaeological or historical deposits;

- The CRM(s) will record, and are authorized to collect, soil samples and artifactual material as warranted for analysis;

- If an intact archaeological or historical deposit is encountered, all soil-disturbing activities in the vicinity of the deposit will cease. The CRM(s) will be empowered to temporarily halt or redirect construction activities and equipment until the resource is evaluated. The CRS will immediately notify BVWSD and/or the appropriate CEQA lead agency of the encountered cultural deposit. The CRS will make a reasonable effort to assess the identity, integrity, and significance of the deposit, and shall present the findings of this assessment to BVWSD and/or the appropriate CEQA lead agency.

If unanticipated resources are discovered during construction, they will be addressed under the procedures set forth in CEQA Guidelines Section 15064.5. If possible, the resource(s) will be avoided first through design modification, and second through protective measures as described above. If the resource(s) cannot be avoided, BVWSD and/or the appropriate CEQA lead agency will consult with the CRS with regard to resource importance and significance. If it is determined that the resource is important, then measures to mitigate impacts to below a level of significance will be devised in consultation with the CRS, and will be carried out by BVWSD, the appropriate CEQA lead agency, the Program participant(s), or a combination of these.

Whether or not significant cultural resources are encountered, the CRS will submit monthly monitoring progress reports and a written report of the findings of the monitoring program to the BVWSD and appropriate CEQA lead agency, as applicable.

7. CUL-7: Construction Crew Education

Prior to commencing construction, all construction crews will be advised of the regulatory protections afforded to cultural resources. The crews will also be informed of procedures relating to the inadvertent exposure of archaeological or historical resources. The crews will be cautioned not to collect artifacts and will be asked to inform a construction supervisor if apparent cultural remains are uncovered.

8. CUL-8: Discovery of Human Remains

Recorded sites, as well as previously undiscovered sites, situated within the vicinity of program facilities may contain human remains. Human remains are often fragile and should be treated with care and respect at all times. The discovery of human remains involves both legal and archaeological issues. Discovery of any human remains in the vicinity of Program facilities is subject to criteria set forth by the Native American Graves Protection and Repatriation Act, 43 CFR Part 10, as amended, 1999. Therefore, the following procedures will be implemented immediately upon the discovery of human remains:

- Stop all excavation work and, using appropriate safety precautions, with a minimum of further disturbance to the remains, allow the Cultural Resources Monitor (CRM) to verify that the discovery is, in fact, human skeletal material. If the remains are determined to be other than human remains, then construction activities may resume upon written authorization by BVWSD or appropriate CEQA lead agency, as applicable.

- If the remains are determined to be human, the CRM will immediately contact, by telephone, the Kern County Public Works Department, who will in turn contact the Kern County Sheriff Department to report the discovery. In addition to the Sheriff, the County Coroner will also be contacted and informed of the discovery. After notifying the appropriate authorities, the CRM will then immediately notify BVWSD and the appropriate CEQA lead agency, as applicable.

- In the event that the County Coroner determines that the human remains are Native American, the CRM will immediately notify the California Native American Heritage Commission (NAHC), who shall appoint a Most Likely Descendant (MLD) (Public Resources Code, Section 5097.98). BVWSD or the appropriate CEQA lead agency, the CRM, and the MLD shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5(d)). The agreement should take into consideration

the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects.

Work within the immediate vicinity of the find shall remain halted until the CEC, after consultation with HEI, CRS, MLD, and relevant agencies, provides written authorization for work to resume in the vicinity of the discovery.

C. PALEONTOLOGICAL RESOURCES

1. PALEO-1: Retain a Qualified Professional Paleontologist

Prior to any Program-related excavations, a qualified professional paleontologist will be retained as the paleontological resources specialist (PRS) who will be responsible for implementation of Mitigation Measures PALEO-2 through PALEO-7.

2. PALEO-2: Inventory for Paleontological Resources

As the specific locations of Program facilities have not yet been determined, and as a paleontological resources inventory has not been conducted within the majority of the Program vicinity, an inventory of paleontological resources is necessary.

Once design of Program facilities has been developed, the PRS will identify the Program's Area of Potential Effects (APE) based on this design. Once the APE has been identified, a literature and museum records search will be conducted to determine the location and extent of any known paleontological resources. Although such searches were conducted for the HECA power plant, they were for that project footprint (including the HECA pipeline) and did not include other components of the Program.

Following the records search, a paleontological resources field survey will be conducted on exposed stratigraphic units within the APE to identify previously unknown fossil localities, and to determine the nature and extent of sensitive stratigraphic units likely to be encountered in the APE. The results of the inventory efforts will be recorded in a Confidential Paleontological Resources Technical Report.

3. PALEO-3: Paleontological Monitoring and Mitigation Plan

The designated PRS will prepare a paleontological resources monitoring and mitigation plan, which will include provisions for preconstruction coordination; construction monitoring; emergency discovery procedures; sampling and data recovery, if needed; preparation, identification, analysis, and museum curation of any fossil specimens and data recovered; and reporting. This monitoring and mitigation plan will be consistent with SVP (1995) standard guidelines for the mitigation of construction-related adverse impacts on paleontological resources, as well as the requirements of the designated museum repository for any fossils collected (SVP 1996).

4. PALEO-4: Construction Personnel Education

To enhance awareness of potential impacts to paleontological resources prior to commencing construction of facilities pursuant to the Program, construction personnel involved with earth-moving activities should be informed (1) that fossils may be discovered during earth-moving activities; (2) that these fossils are protected by laws; (3) about the appearance of common fossils; and (4) about proper notification procedures. This worker training should be prepared and presented by a qualified paleontologist.

5. PALEO-5: Paleontological Monitoring

Prior to any Program-related ground disturbance, the PRS will conduct a field survey of sensitive stratigraphic units that will be disturbed within the APE, and any fossils discovered will be salvaged. BVWSD or the appropriate CEQA lead agency, as applicable, in consultation with the Program participant, the PRS, or both, will determine what activities shall be monitored. In most cases, any activities that expose previously undisturbed sediments, such as excavation, grading, trenching for utilities installation,

foundation work, etc., will require paleontological monitoring because of the risk these activities pose to potential paleontological resources and to their depositional context. Some excavation activities, such as well-drilling, may not need to be monitored, due the low probability of identifiable paleontological resources being salvaged. Monitoring will not need to be conducted in areas where sediments have been previously disturbed or in areas where exposed sediments will be buried, but not otherwise disturbed. Construction monitoring will be conducted to ensure that unanticipated discoveries are addressed in an appropriate and timely manner.

6. PALEO-6: Preparation, Identification, and Curation

Upon completion of construction activities, any salvaged fossil specimens will be prepared, identified, and accessioned into a qualified museum repository for permanent storage.

7. PALEO-7: Final Report

The PRS will prepare a Paleontological Resources Monitoring and Mitigation Program Final Report containing the results of the paleontological monitoring and mitigation plan implemented during construction. Said report will be provided to BVWSD, appropriate lead agencies, and Program participants, as appropriate.

D. SOILS AND WATER QUALITY

1. SOIL-1: Grading

Conduct grading operations in compliance with good industry standard practices and Kern County grading permit requirements.

2. SOIL-2: Storm Water Pollution Prevention Plan

Conduct construction and operational activities in accordance with a construction phase Storm Water Pollution Prevention Plan (SWPPP) and associated monitoring program.

3. SOIL-3: Erosion Control Measures

Temporary erosion control measures will be implemented as needed. Typically, temporary erosion control measures include revegetation, slope stabilizers, dust suppression, construction of berms and ditches, and sediment barriers. Vegetation is the most desirable form of erosion control because it stabilizes the soil and maintains the landscape.

During construction of facilities pursuant to the Program, employment of control measures will minimize the wind-blown erosion of soil from construction areas, such as dust suppression (spraying water) and timely vegetation of barren construction areas. BMPs identified in the SWPPP will be in place prior to commencement of ground-disturbing activities. At this time, these plans do not exist, but they will be developed and implemented prior to initiation of any on- or off-site ground-disturbing activities.

Sediment barriers such as straw bales or silt fences, will be used as necessary to slow runoff and trap sediment. Runoff retention basins, drainage diversions, and other large-scale sediment traps are not expected to be needed because of the relatively level topography. Soil stockpiles generated during construction will be covered and protected from precipitation if left on the site for extended periods of time.

4. WATER-1: General Construction Activity Storm Water Permit

Prior to beginning any clearing, grading, or excavating activities associated with construction of facilities pursuant to the Program, a SWPPP will be prepared and implemented pursuant to the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity issued by the State Water Resources Control Board.

E. HYDROLOGY

HYDRO-1: Groundwater Monitoring Plan and MOU

During implementation of the Program, the District will conduct all Program operations in accordance with the Buena Vista Water Storage District Groundwater Monitoring Plan (Groundwater Monitoring Plan) and Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (MOU). Copies of the Groundwater Monitoring Plan and the MOU are included in Appendices B and C of the Program EIR.

SECTION XI

SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF THE PROPOSED PROGRAM IS IMPLEMENTED

SECTION XI
SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF THE PROPOSED PROGRAM IS IMPLEMENTED

With incorporation of the mitigation measures set forth in Sections V and X herein, any adverse environmental effects of the Program will be avoided or reduced to a level less than significant. Therefore, the Program will not result in any significant environmental effects which cannot be avoided if the proposed Program is implemented.

SECTION XII

PUBLIC INVOLVEMENT AND AGENCY COORDINATION

SECTION XII
PUBLIC INVOLVEMENT AND AGENCY COORDINATION

PUBLIC INVOLVEMENT

A Notice of Preparation (NOP) of a Draft Environmental Impact Report was circulated by BVWSD on November 25, 2008 to the agencies, firms, and individuals listed below, along with an announcement for a public scoping meeting. The NOP was also submitted to the State Clearinghouse of the Governor's Office of Planning and Research (SCH No. 2009011008). Copies of the NOP and the Notice of Completion submitted to the State Clearinghouse are included in Appendix E.

- Antelope Valley-East Kern Water Agency
- Beale Memorial Library
- Belridge Water Storage District
- Berrenda Mesa Water District
- California Energy Commission
- California Department of Fish and Game, Central Region Headquarters Office
- California Department of Water Resources, State Water Project Analysis Office
- Castaic Lake Water Agency
- Cawelo Water District
- City of Bakersfield Water Resources Department
- East Niles Community Services District
- Henry Miller Water District
- Indian Wells Valley Water District
- Inyo County Planning Department
- Kern County Planning Department
- Kern County Water Agency
- Kern County Water Agency Improvement District 4
- Kern Delta Water District
- Kern Water Bank Authority
- Kings County Community Development Department
- Los Angeles County Department of Regional Planning
- Lost Hills Water District
- Monterey County Resource Management Agency—Planning Department
- North Kern Water Storage District

- Rosedale-Rio Bravo Water Storage District
- San Bernardino County Community Development Division
- San Luis Obispo County Department of Planning and Building
- Santa Barbara County Planning and Development
- Semitropic Water Storage District
- Tulare County Countywide Planning Division
- United States Fish and Wildlife Service
- Ventura County Planning Division
- Water Agency, Inc.
- West Kern Water District
- Wheeler Ridge-Maricopa Water Storage District

A public scoping meeting was held at the offices of the Buena Vista Water Storage District at 525 North Main Street, Buttonwillow CA 93206 at 10:00 a.m. on December 12, 2008. Those in attendance at the scoping meeting are listed below:

- Robert Hartsock, District Counsel
- David Hampton, Buena Vista Water Storage District
- Terry Chicca, Buena Vista Water Storage District
- Jerry Pearson, West Kern Water District
- Lauren Bauer, Kern County Water Agency
- Dan Bartel, Buena Vista Water Storage District

Written Comments on the proposed scope of the DEIR were received from the California Department of Water Resources, State Water Project Analysis Office, Water Contracts Branch.

BVWSD staff gave an informal presentation about the Program at the KCWA Member Unit Managers Meeting on December 11, 2008. BVWSD staff also consulted with the Central Valley Regional Water Quality Control Board and with the Berrenda Mesa Water Storage District on December 15, 2008 and on December 22, 2008, respectively, regarding the proposed Program.

The proponent of and lead agency for the Program is BVWSD. As set forth in Section II herein, the District contracts with KCWA for an annual firm entitlement of 21,300 AF/yr and a surplus entitlement of 3,750 AF/yr of SWP water via KCWA. The District will obtain prior approval from DWR and KCWA prior to using SWP water for any use other than that which has been previously approved.

Use of high-flow Kern River water pursuant to the WEP does not require State Water Resources Control Board (SWRCB) approval. BVWSD's rights to Kern River water are pre-1914 appropriative rights. With respect to such rights, the California Water Code provides the following:

> ***§1706. Persons entitled to make changes****. The person entitled to the use of water by virtue of an appropriation other than under the Water Commission Act or this code may change the point of diversion, place of use, or purpose of use if others are not injured by such change, and may extend the ditch, flume, pipe, or aqueduct by which the diversion is made to places beyond that where the first use was made.*

Therefore, BVWSD is entitled to change the point of diversion, place of use, and purpose of use of its high-flow Kern River water without first seeking permission from the SWRCB, provided that others are not injured by such change. BVWSD will obtain prior approval from the SWRCB should they decide to use other waters for exchange that require such approval.

SECTION XIII

ORGANIZATIONS AND PERSONS CONSULTED

SECTION XIII
ORGANIZATIONS AND PERSONS CONSULTED

The following organizations and individuals were consulted during the preparation of this document:

Berrenda Mesa Water Storage District
- Harry Starkey, General Manager

California Energy Commission
- Rod Jones, Project Manager

Central Valley Regional Water Quality Control Board
- Dr. Karl Longley, Director

Hydrogen Energy International LLC
- Matthew Lemmons

Kern County Water Agency
- Lauren Bauer, Water Resources Planner
- Curtis Creel
- Lloyd Fryer
- Holly Melton

Sierra Scientific Services
- Robert A. Crewdson, Hydrogeologist/Water Resources Analyst

URS Corporation
- Dale Shileikis, Project Manager
- George Muehleck, Senior Hydrogeologist
- Kathy Rushmore

West Kern Water District
- Jerry Pearson, General Manager

SECTION XIV

REFERENCES AND SOURCES

SECTION XIV
REFERENCES AND SOURCES

- Buena Vista/Rosedale-Rio Bravo Water Banking and Recovery Program Final Environmental Impact Report, Krieger & Stewart; September 2002

- Buena Vista Water Storage District Initial Study and Mitigated Negative Declaration for the 2006 Groundwater Transfer Program, Krieger & Stewart; October 2006

- Buena Vista Water Storage District Initial Study, Environmental Checklist, and Mitigated Negative Declaration for the 2002 Ground Water Transfer Program, Krieger & Stewart; March 2002

- California Code of Regulations, Title 14, Division 6, Chapter 3; Guidelines for Implementation of the California Environmental Quality Act, Section 15000 *et seq.;* As Amended July 27, 2007

- California Department of Toxic Substances Control Website, EnviroStor Database located at www.envirostor.dtsc.ca.gov/public

- Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Mobile Sources, USEPA, May 2008

- Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Stationary Combustion Sources, USEPA, May 2008.

- Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Indirect Emissions from Purchases/Sales of Electricity and Steam, USEPA, June 2008

- Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Optional Emissions from Commuting, Business Travel and Product Transport, USEPA, May 2008

- Climate Leaders Greenhouse Gas Inventory Protocol: Design Principles, USEPA, May 2005

- Crewdson, Robert A., *in preparation 2009,* A Preliminary Evaluation of the Geology, Hydrology, and Groundwater Geochemistry of the Buena Vista Water Storage District, Sierra Scientific Services, Bakersfield, CA

- Criteria for a Recommended Standard, Occupational Noise Exposure (Publication No. 98-126), National Institute for Occupational Safety and Health, June 1998

- Groundwater Status and Management Plan for Buena Vista Water Storage District; Boyle Engineering Corporation; September 9, 1997, Revised May 14, 2002

- Kern County General Plan, Kern County Planning Department; March 13, 2007

- Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, California Department of Conservation, Division of Mines and Geology; February 1998

- Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program; effective January 1, 2003

- Ordinance Code of Kern County, November 2008

- Revised Application for Certification for Hydrogen Energy California, Kern County, California, Volumes 1 and 2, URS, May 2009

- Soil Survey of Kern County, California, Northwestern Part, United States Department of Agriculture, Soil Conservation Service, September 1988

- South Coast Air Quality Management District Draft Guidance Document - Interim CEQA Greenhouse Gas (GHG) Significance Threshold, South Coast Air Quality Management District, October 2008

- Special Publication 42; Fault-Rupture Hazard Zones in California, California Department of Conservation, California Geological Survey, Interim Revision 2007

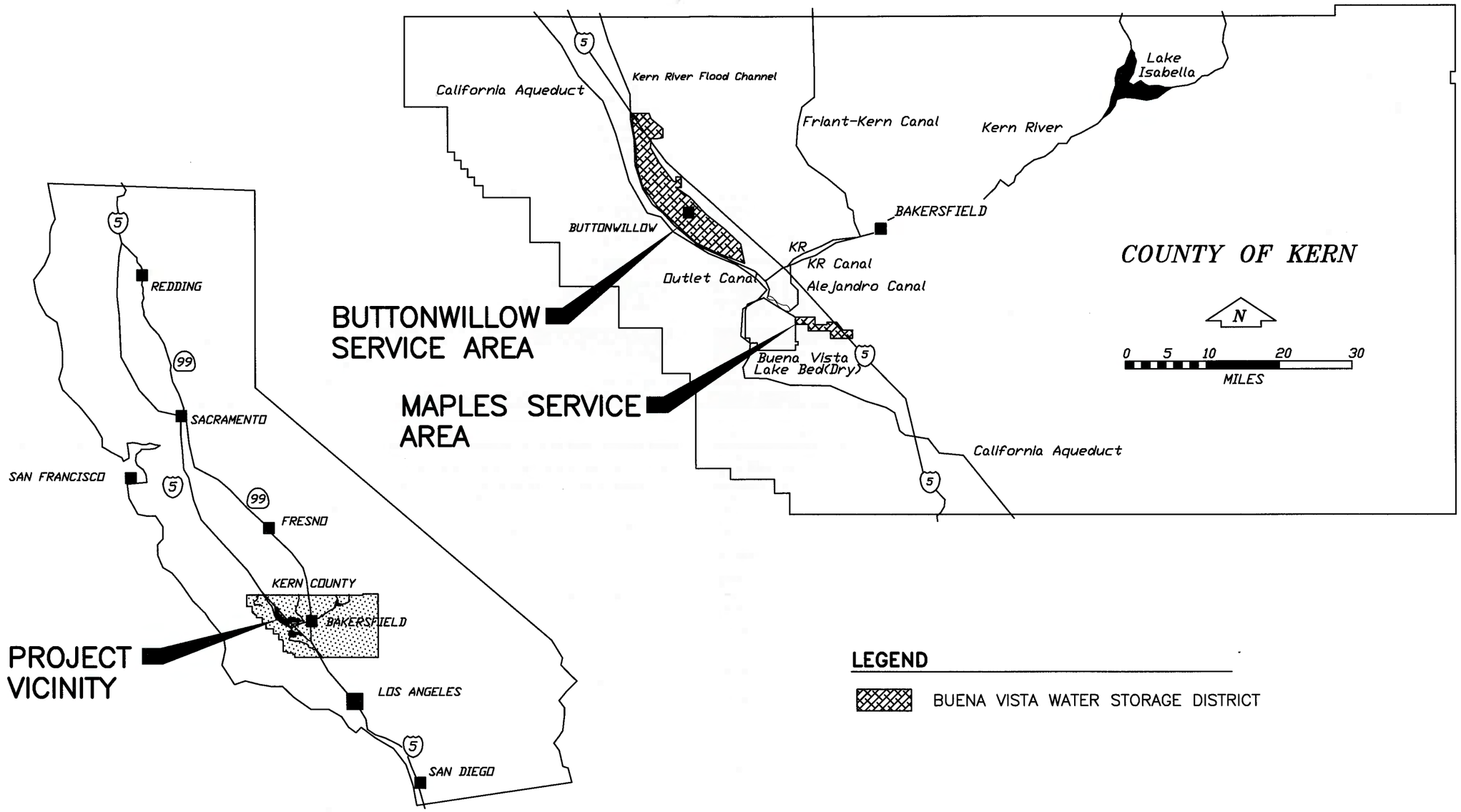
- United States Geological Survey Maps for the following: 7.5 Minute Series (Topographic) Quadrangles; Semitropic, Millax, Tupman, Buttonwillow, East Elk Hills, Lost Hills, Lokern, Wasco SW, Belridge, and West Elk Hills

- Water Quality for Agriculture, R.S. Ayers and Westcot, D.W.; First Published 1976, Revised 1985

- Western Regional Climate Center Website, www.wrcc.dri.edu

.

FIGURES



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BUENA VISTA WATER STORAGE DISTRICT

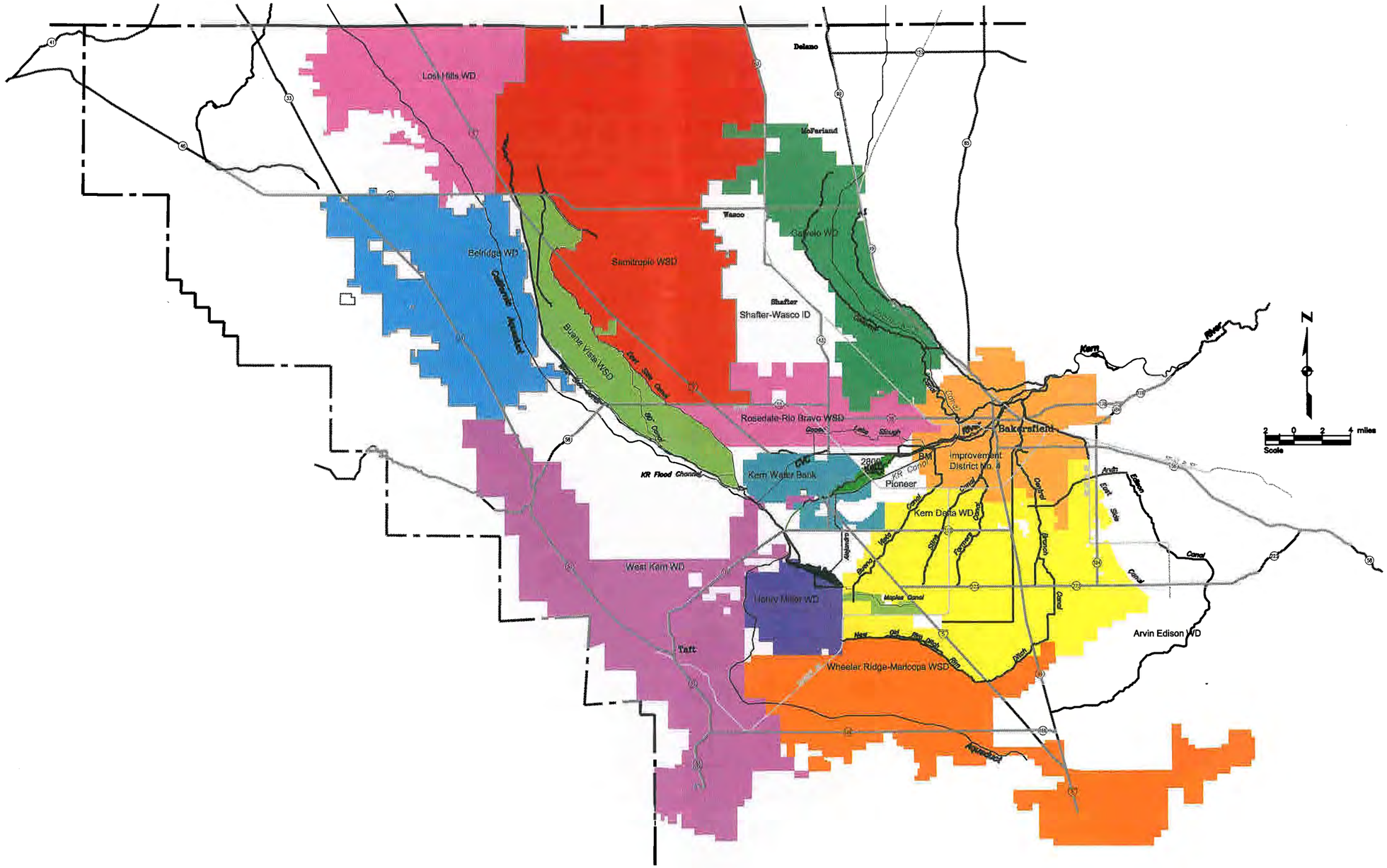
BUENA VISTA WATER MANAGEMENT PROGRAM

PROGRAM VICINITY

SCALE: N.T.S. DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 1 OF 10

578-8F1.DWG



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BUENA VISTA WATER STORAGE DISTRICT

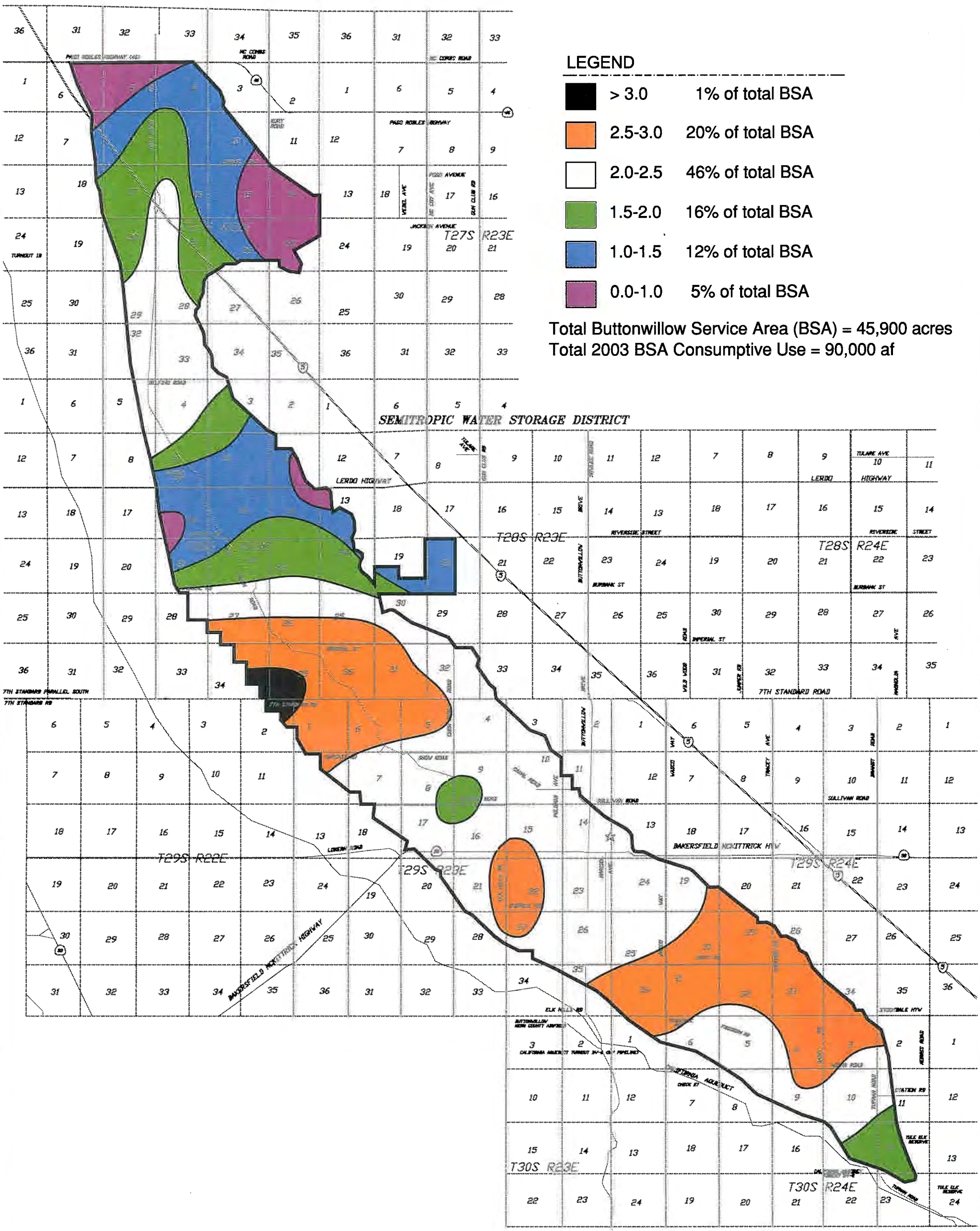
BUENA VISTA WATER MANAGEMENT PROGRAM

DISTRICT LOCATION AND NEIGHBORING DISTRICTS

SCALE: 1"=40,000' | DATE: 09/25/09 | DRAWN BY: JGS | CHECKED BY: VEM | W.O.: 578-8.2

FIGURE 2 OF 10

578-8F2.DWG



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BUENA VISTA WATER STORAGE DISTRICT

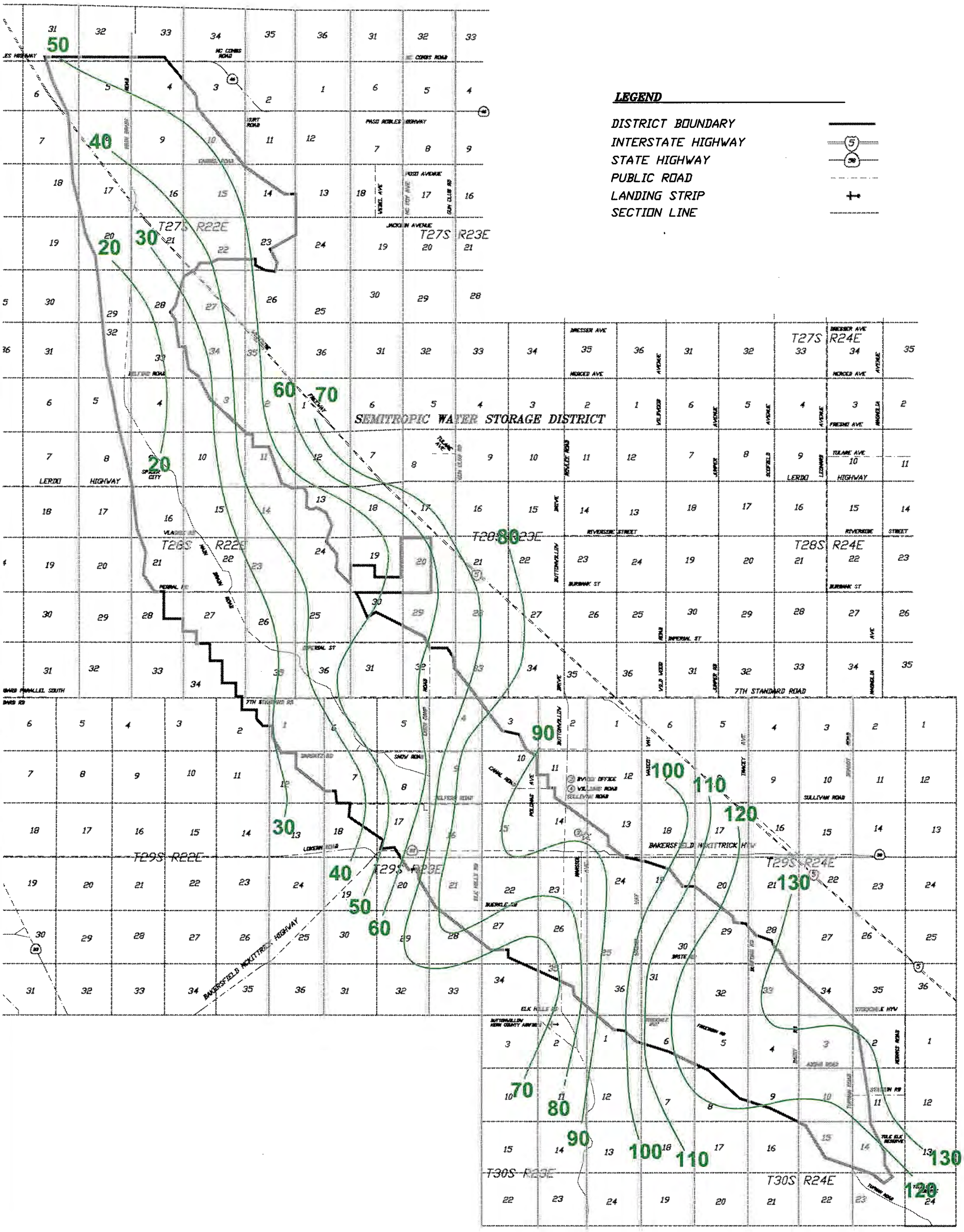
BUENA VISTA WATER MANAGEMENT PROGRAM

ONE-YEAR CROP CONSUMPTIVE USE DENSITY JANUARY-DECEMBER 2003

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 3 OF 10

578-8F3.DWG



Buttonwillow Service Area

NOTE:

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BUENA VISTA WATER STORAGE DISTRICT

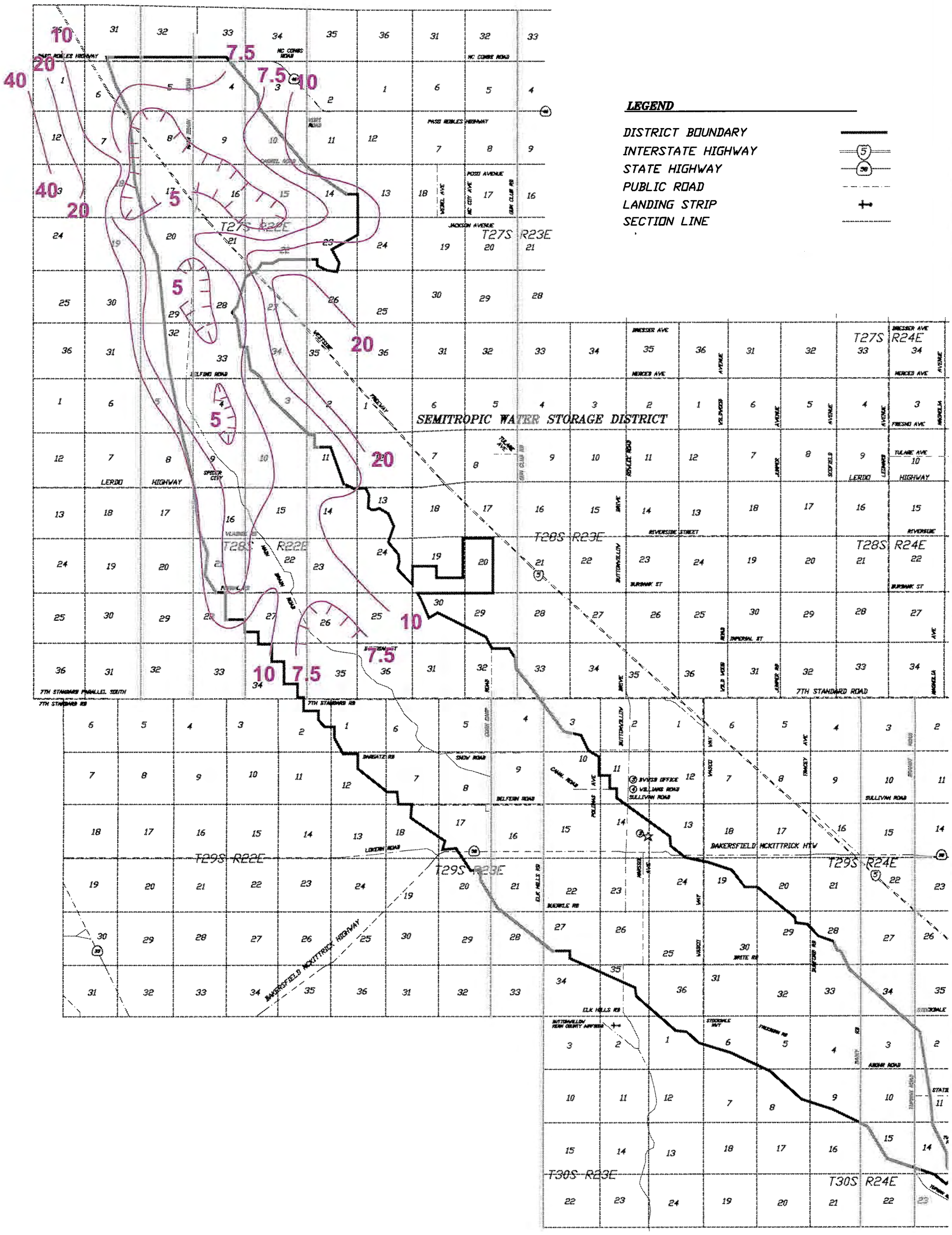
BUENA VISTA WATER MANAGEMENT PROGRAM

DEPTH TO GROUNDWATER, 2008 (IN FEET BELOW GROUND SURFACE)

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 4 OF 10

578-8F4.DWG



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BUENA VISTA WATER STORAGE DISTRICT

BUENA VISTA WATER MANAGEMENT PROGRAM

DEPTH TO SHALLOW PERCHED GROUNDWATER, 2008 (IN FEET BELOW GROUND SURFACE)

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

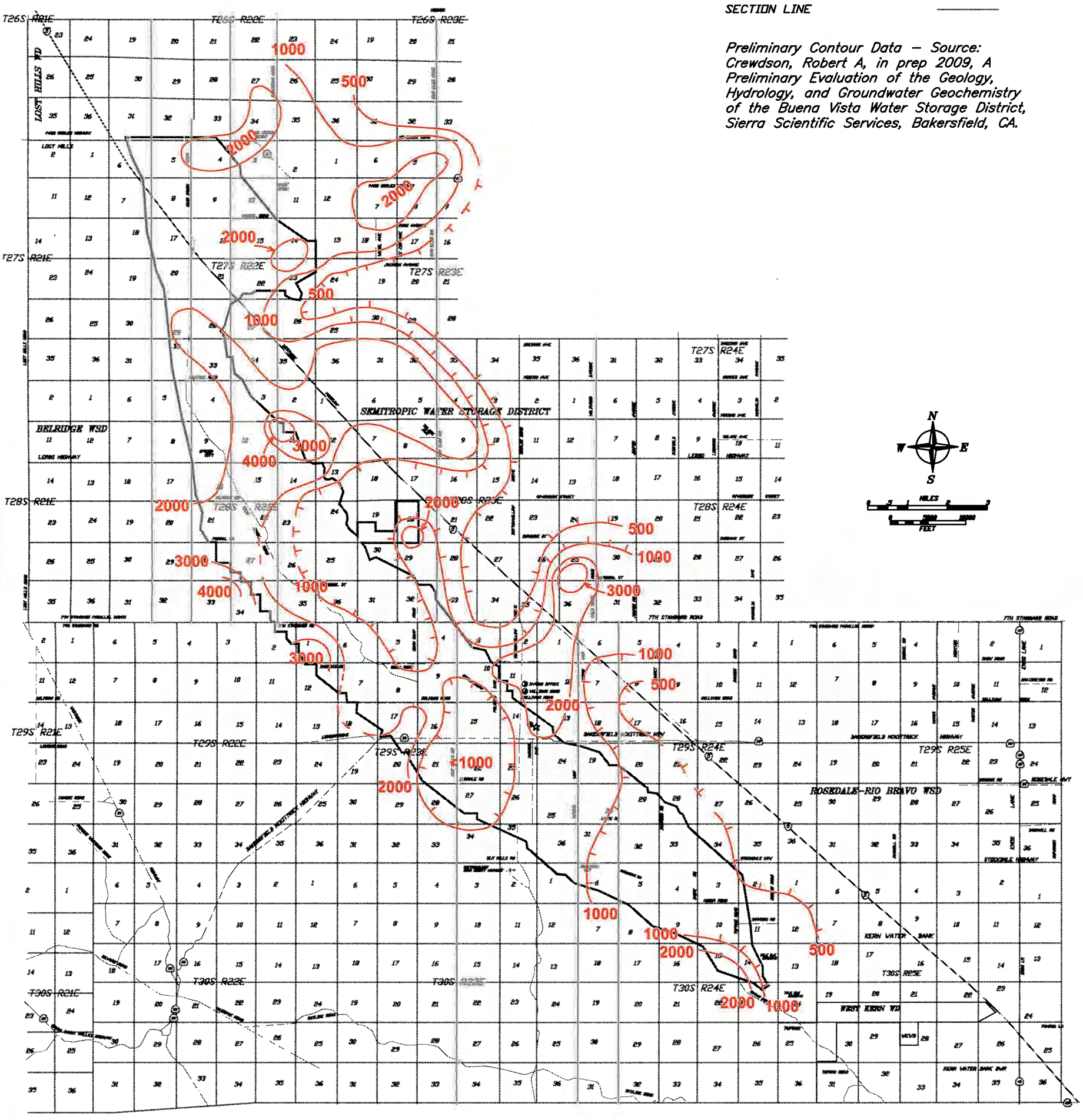
FIGURE 5 OF 10

578-8F5.DWG

LEGEND

DISTRICT BOUNDARY
INTERSTATE HIGHWAY
STATE HIGHWAY
PUBLIC ROAD
LANDING STRIP
SECTION LINE

Preliminary Contour Data – Source: Crewdson, Robert A, in prep 2009, A Preliminary Evaluation of the Geology, Hydrology, and Groundwater Geochemistry of the Buena Vista Water Storage District, Sierra Scientific Services, Bakersfield, CA.



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BUENA VISTA WATER STORAGE DISTRICT

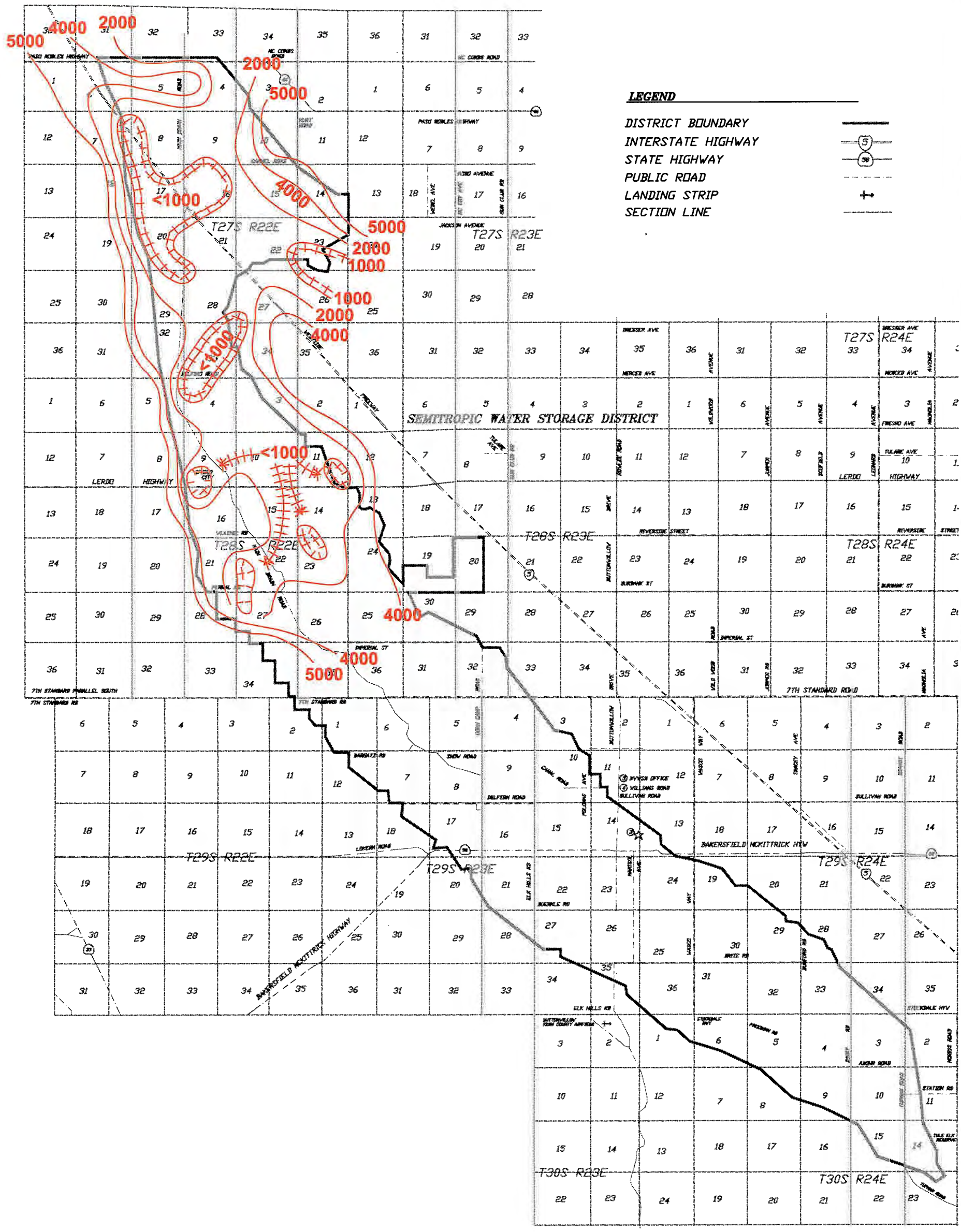
BUENA VISTA WATER MANAGEMENT PROGRAM

GROUNDWATER TOTAL DISSOLVED SOLIDS (MG/L) COMPOSITE 1970–2007

FIGURE 6 OF 10

SCALE: 1"=15,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

578-8F6.DWG



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NOTE:

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BUENA VISTA WATER STORAGE DISTRICT

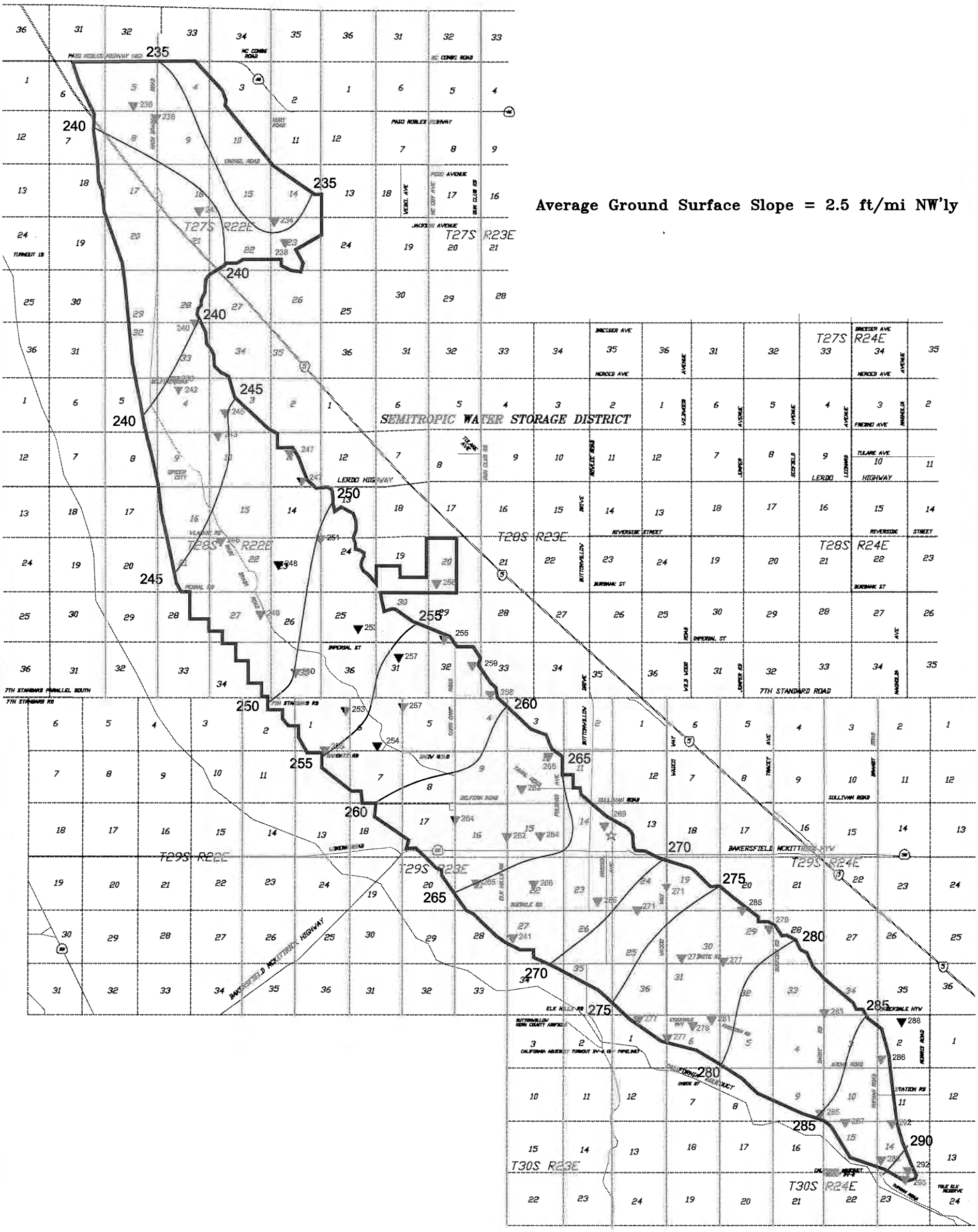
BUENA VISTA WATER MANAGEMENT PROGRAM

SHALLOW PERCHED GROUNDWATER TOTAL DISSOLVED SOLIDS (MG/L), 2008

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 7 OF 10

578-8F7.DWG



NOTE:

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BUENA VISTA WATER STORAGE DISTRICT

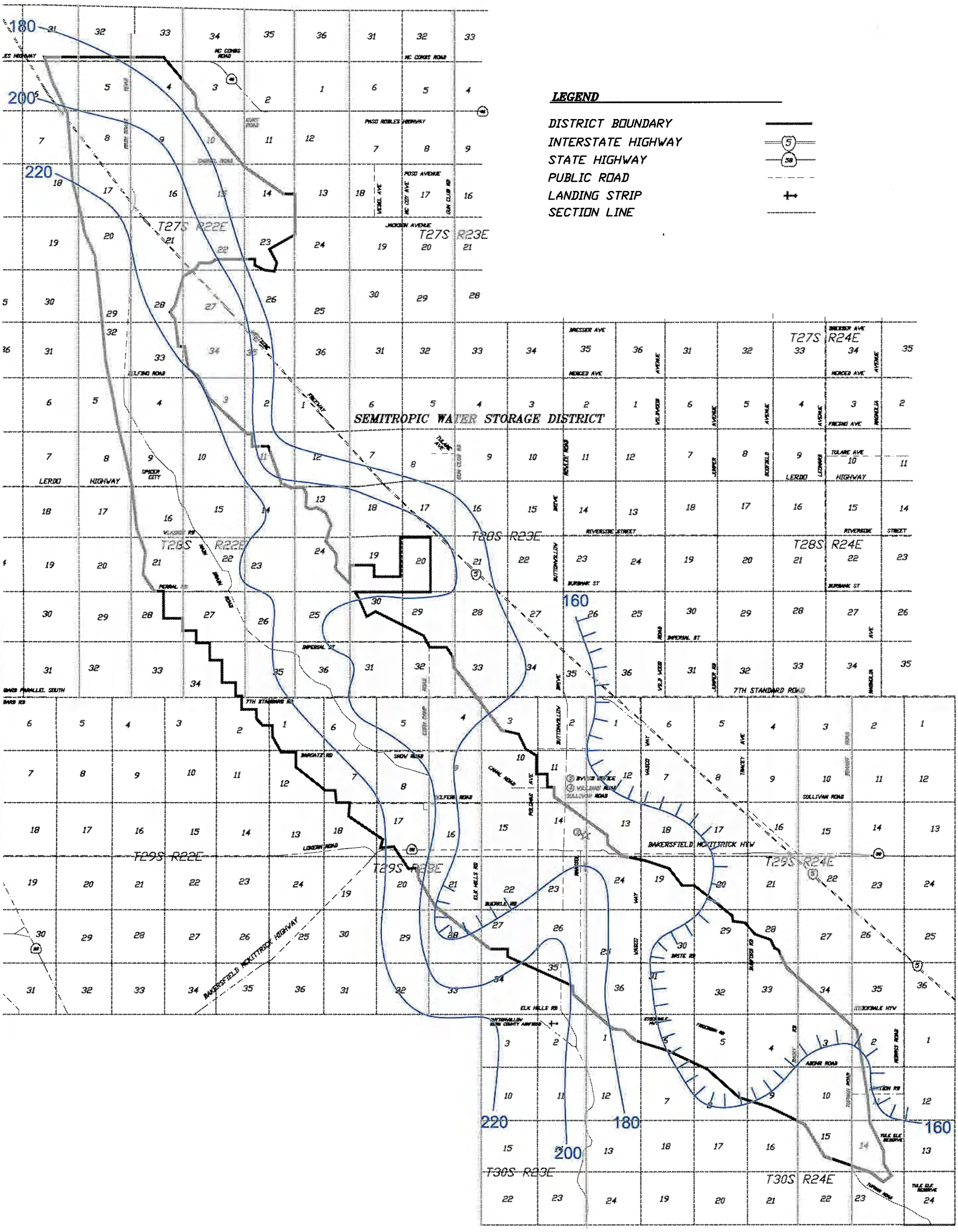
BUENA VISTA WATER MANAGEMENT PROGRAM

DISTRICT GROUND SURFACE ELEVATION (IN FEET ABOVE MEAN SEA LEVEL)

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 8 OF 10

578-8F8.DWG



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NOTE:

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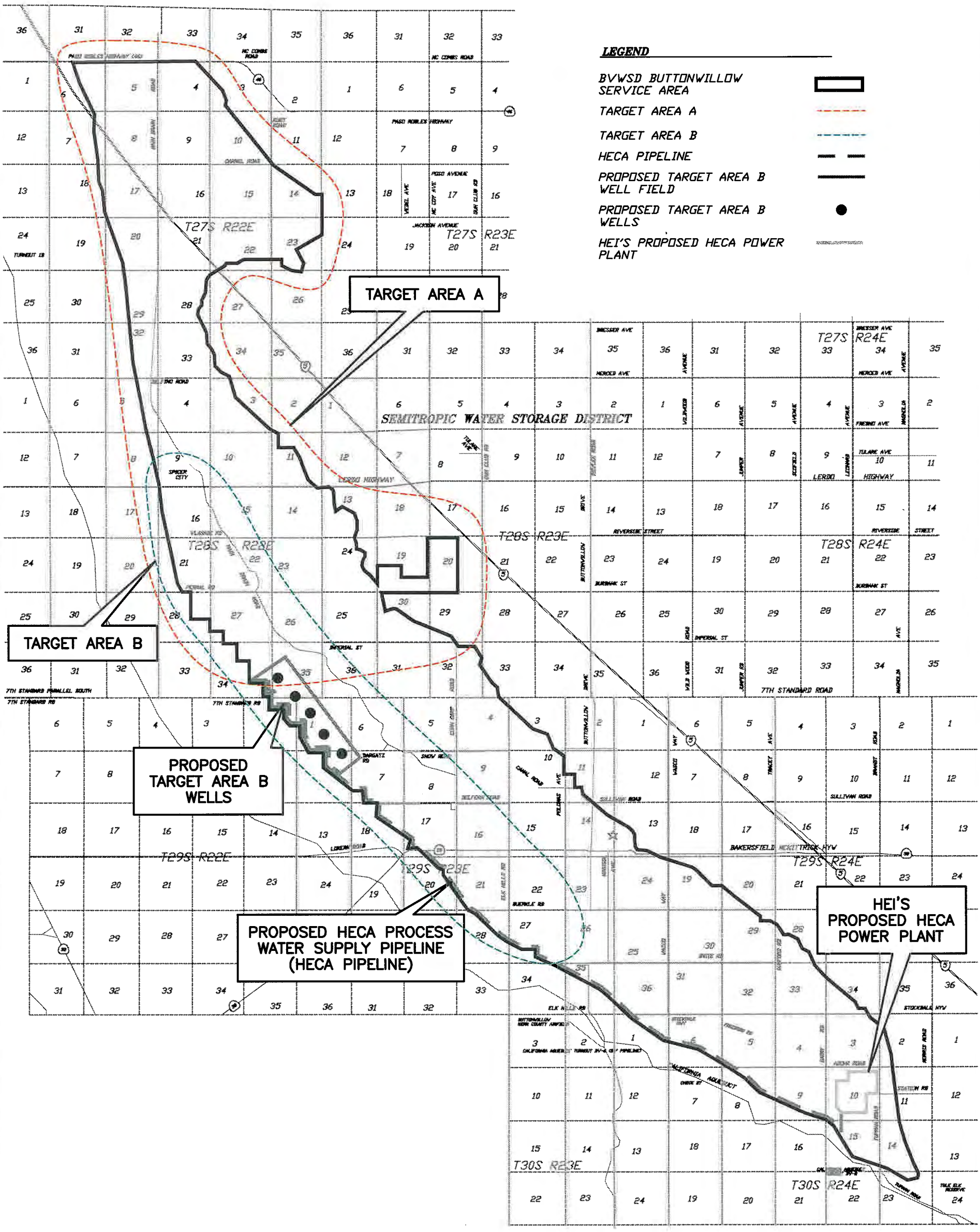
BUENA VISTA WATER STORAGE DISTRICT

BUENA VISTA WATER MANAGEMENT PROGRAM

DISTRICT GROUNDWATER ELEVATION, 2008 (IN FEET ABOVE MEAN SEA LEVEL)

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

FIGURE 9 OF 10



NOTE:

BASE MAP PROVIDED BY BUENA VISTA WATER STORAGE DISTRICT.

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BUENA VISTA WATER STORAGE DISTRICT

BUENA VISTA WATER MANAGEMENT PROGRAM

BRACKISH GROUNDWATER REMEDIATION PROJECT

FIGURE 10 OF 10

SCALE: 1"=10,000' DATE: 09/25/09 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8.2

578-8F10.DWG

APPENDIX A

BVWSD WATER BALANCE FOR YEARS 1970-2007
AND
BVWSD FORECASTED GROUNDWATER BALANCE FOR YEARS 2000-2080

BUENA VISTA WSD WATER BALANCE

YEAR	[1] KR A-J RUNOFF % OF AVG	[2] WATER SUPPLY KR SUPPLY (AF)	[3] FK SUPPLY (AF)	[4] SWP SUPPLY (AF)	[5] SWP - A21 SUPPLY (AF)	[6] OTHER SUPPLY (AF)	[8] SAFE YIELD MINOR STREAMS (AF)	[9] SAFE YIELD PRECIP (AF)	[10] TOTAL WATER SUPPLY (AF)	[11] WATER DEMANDS CROP USE (AF)	[12] INDUSTRIAL USE (AF)	[14] PROJECT USE (AF)	[15] EVAP LOSS (AF)	[16] GOOSE LAKE OUTFLOW (AF)	[17] MOU LOSS (AF)	[18] WATER USE (AF)	[19] ANNUAL BALANCE (AF)	[20] ACCUM BALANCE (AF)
1970	69	120,361	7,310	10,284				17,647	155,602	105,076			2,332	9,086		116,494	39,108	39,108
1971	53	81,466	7,787	14,638				18,860	122,751	105,076			2,177	4,897		112,150	10,601	49,709
1972	28	32,853		35,206	2,700			9,879	80,638	99,391			2,288	740		102,419	(21,781)	27,927
1973	156	149,082	746	5,548				24,884	180,260	111,640			2,128	12,137		125,905	54,355	82,282
1974	115	160,269	14,771	20,875				25,217	221,132	115,768			2,122	6,121		124,011	97,121	179,403
1975	83	138,779		32,464				15,850	187,093	121,174			2,153	7,384		130,711	56,382	235,784
1976	23	40,747		25,137				18,086	83,970	115,063			2,138	4,463		121,664	(37,694)	198,090
1977	21	5,310		4,912				19,061	29,283	111,616			2,068	420		114,104	(84,821)	113,270
1978	236	238,040		969				36,914	275,923	120,059			2,017	13,877		135,953	139,970	253,240
1979	90	132,920	9,913	30,009	24,391			22,018	219,251	111,286			1,935	12,807		126,028	93,223	346,463
1980	213	271,540		856				20,889	293,285	112,780			1,880	18,295		132,955	160,330	506,793
1981	54	64,454		62,000	11,692			21,506	159,652	112,536			2,157	12,351		127,044	32,608	539,401
1982	172	182,654	34,882	14,200	15,976			25,581	273,293	112,883	703		1,852	15,904		131,342	141,951	681,351
1983	333	270,855	26,084	1,579				32,075	330,593	97,927	1,103	20,888	1,955	13,264		135,137	195,456	876,808
1984	91	154,914	2,289	55,937				11,821	224,961	109,366	1,148		2,252	16,478		129,244	95,717	972,524
1985	91	132,534		23,138	205			13,122	168,999	106,262	1,363		1,965	16,123		125,713	43,286	1,015,810
1986	191	230,925	10,276	1,438				18,601	261,240	103,154	960	2,041	2,043	24,589		132,787	128,453	1,144,264
1987	46	78,835		21,896				19,433	120,164	99,168	927	6,000	1,937	14,916		122,948	(2,784)	1,141,479
1988	35	50,470		25,328				14,655	90,453	103,320	690	5,000	2,103	16,309		127,422	(36,969)	1,104,511
1989	51	59,021		26,893				9,446	95,360	100,317	643	3,138	2,037	5,080		111,215	(15,855)	1,088,655
1990	25	21,124		4,885				11,723	37,732	105,159	555	2,242	2,039	4,165		114,160	(76,428)	1,012,227
1991	60	56,983		1,288				21,617	79,888	105,075	663	4,410	2,055	4,558		116,761	(36,873)	975,354
1992	39	42,594		1,824				27,647	72,065	110,298	549	4,004	2,082	3,927		120,860	(48,796)	926,558
1993	126	90,385	9,832	57,230				26,198	183,645	113,622	529		1,968	8,641		124,760	58,885	985,443
1994	41	73,712		11,267	5,403			22,341	112,723	103,758	536		2,167	8,404		114,865	(2,142)	983,302
1995	200	293,072	12,451	21,300				33,072	359,895	112,902	649	2,000	1,895	28,394	4,280	150,120	209,775	1,193,077
1996	129	222,028	15,938	29,900				27,299	295,165	113,409	1,241	7,467	2,114	23,555	1,474	149,260	145,905	1,338,982
1997	123	221,942	19,456	21,300				20,172	282,870	106,883	1,406	7,080	1,974	28,118	2,969	148,430	134,440	1,473,422
1998	245	307,672	22,339	21,300				45,206	396,517	113,188	1,384	1,309	1,901	31,760	5,830	155,372	241,146	1,714,568
1999	54	55,237	13,701	46,300	1,107			20,472	136,817	106,919	1,232		1,796	23,067	13	133,027	3,790	1,718,358
2000	66	61,535		27,837	2,703			18,052	110,127	102,937	1,500	8,613	1,803	23,083		137,936	(27,809)	1,690,549
2001	54	44,697		8,786	480	1,693		23,722	79,378	99,924	571	29,915	1,908	7,060	1,021	140,399	(61,021)	1,629,528
2002	46	57,845		13,451	1,511			12,725	85,532	93,321	1,264	33,073	1,302	5,035	750	134,745	(49,213)	1,580,315
2003	70	88,191		22,284	655			16,119	127,249	97,971	1,372	42,187	1,343	9,913	825	153,611	(26,363)	1,553,953
2004	48	78,550		10,987	3,341			17,507	110,385	102,224	1,328	28,005	1,415	9,098	310	142,380	(31,995)	1,521,958
2005	168	222,670	1,811	22,341	36,398			21,380	304,600	99,375	1,303	14,458	2,452	7,864	10,624	136,076	168,524	1,690,482
2006	169	177,597	20,714	18,848	32,792			20,278	270,229	102,145	1,569	1,966	2,343	12,591	6,522	127,136	143,092	1,833,574
2007	26	63,714	36,999	13,840	12,467			9,513	136,533	98,519	2,209	92,082	1,455	7,867	4,443	206,575	(70,042)	1,763,532
1970-07	101.1	129,070	7,224	20,764	4,103	46		21,367	182,574	109,770	740	8,537	2,042	12,766	1,056	134,911	46,409	

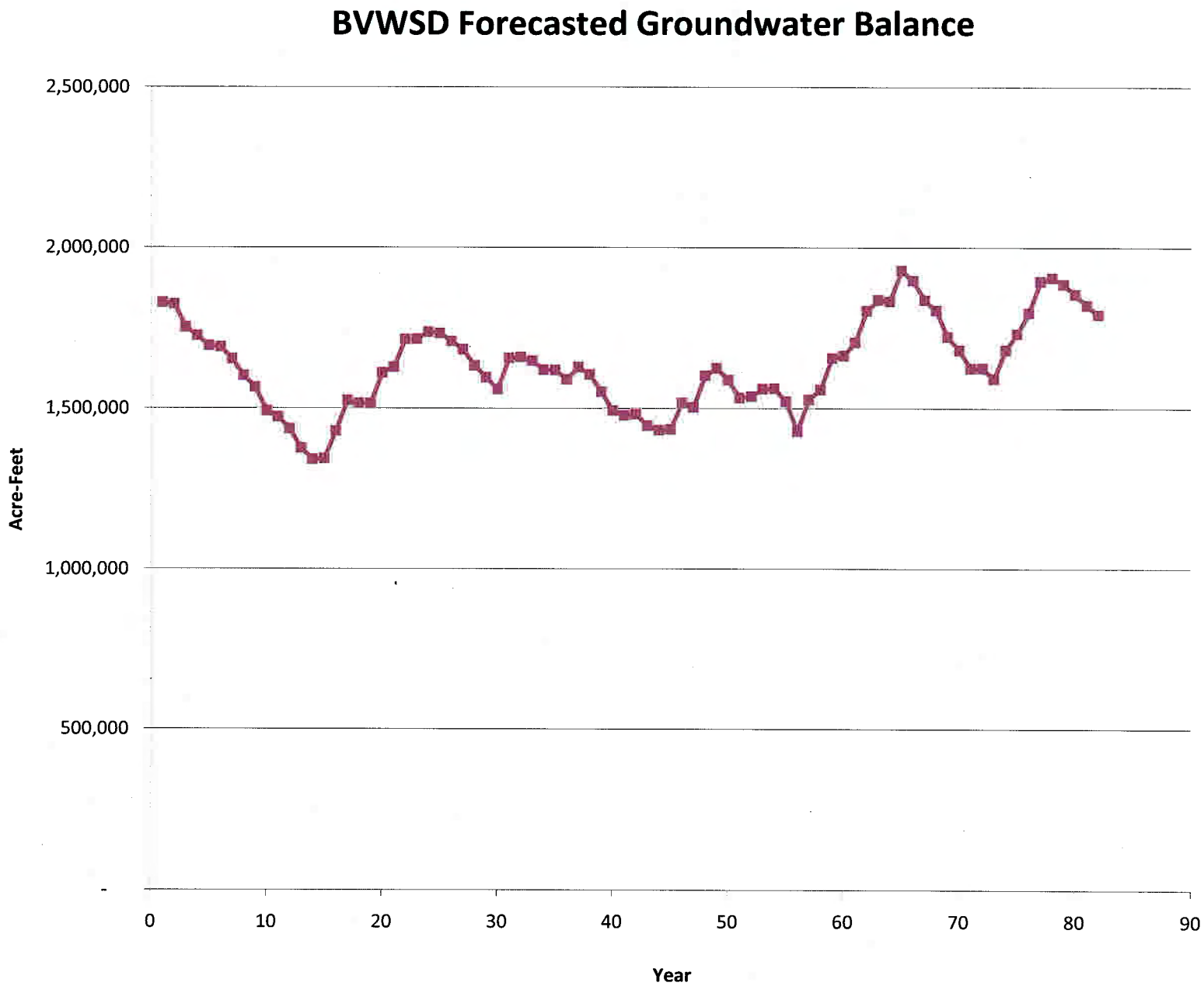
NOTES:

[1] April-July Runoff of the Kern River in % of average (1894-2005 = 464,430 AF)
[2] BV KR Supply (Surface deliveries to KR Intertie and surface sales to other in county jurisdictions downstream of 2nd Point taken out)
[3] FK supplies (NO BANKING FOR 3RD PARTY)
[4] SWP + pool purchases (NO BANKING FOR 3RD PARTY)
[5] Art 21 purchases
[6] Other purchased supplies

[8] Proportionate share of unappropriated minor local streams (#'s in discussion so left out for now)
[9] Gross Precip estimated at Meadows Field x cropped acreage + effective precip on other surfaces.
[10] = Sum of [2] through [9].

[11] Estimated crop water use (transpiration and soil evap) per CSPU.
[12] Industrial recovery contracts from BVWSD to westside oilfields

[14] Special project deliveries and Kern Fan pumping
[15] Water surface evaporation losses.
[16] Flows north of Hwy 46 (not including wheeling but including sales)
[17] = MOU agreed to project losses start in 1995
[18] = Sum of [11] through [17].



Prepared by: BVWSD, March 13, 2009

APPENDIX B

BVWSD GROUNDWATER MONITORING PLAN

BUENA VISTA WATER STORAGE DISTRICT

GROUNDWATER MONITORING PLAN

The landowners of the District have long realized the importance of their groundwater supply. District staff, as directed by the Board of Directors, began monitoring the groundwater as early as the 1940s. Today the District not only maintains explicit surface water delivery records, but comprehensive groundwater monitoring records as well. Both of these programs have progressed with new technologies as new concerns for our basin's protection materialize. The goal of groundwater monitoring is to identify the causes of and find solutions to increasing pumping depths, perched water tables, and groundwater quality degradation. Of course, pumping costs increase as the depth to groundwater increases. Crop yields suffer due to shallow, saline groundwater continually in the root zone. Crop yields also decrease as groundwater quality degrades. The cause and effect relationship of such groundwater and water quality parameters provides for better management decisions. It is expected the District will continue to cooperate, participate, and contribute to the local water management community which is tasked to improve data collection and understanding of the Kern groundwater basin and how to best and equitably manage it. To that end this plan is always subject to modification and revision.

Production Well Surveys. The District currently measures the depth to groundwater in 57 of more than 200 irrigation wells quarterly. Water quality samples are also taken from about 25 wells and analyzed for standard irrigation constituents and other constituents of concern annually or when possible due to pumping cycles. Every five years, a full well survey monitors and classifies all irrigation wells within the District. Recorded data includes well location, state of use, depth to water, and any available pumping equipment physical characteristics.

Monitoring Wells. Currently there are 19 designated monitoring wells throughout the District (shown on attached map, "Monitored Pumping Zone Wells"). The District most recently completed three new monitoring wells in early 1994 (DMW-6, DMW-7, and DMW-8). They were located within the central part of the Buttonwillow service area to better cover the North-South alignment of the existing monitoring well grid. In 1992, in cooperation with the Kern Water Bank, the Department of Water Resources (DWR) installed three double completion monitor wells in the southern portion of the Buttonwillow service area to coordinate monitoring with the Kern Water Bank activities. All of the monitor wells are measured for depth to water quarterly and samples are taken and analyzed for standard irrigation constituents and other constituents of concern annually (summer).

Shallow Piezometers. The District, in conjunction with the Department of Water Resources (DWR), has also installed 94 shallow piezometers, designed to assist in monitoring the shallow groundwater table within the northern portion of the District. These 20 foot deep wells measure the groundwater found in the upper zone of the soil profile. They are measured for depth to water quarterly and for salinity levels annually (spring). This data provides the information needed to plot shallow groundwater level contours to denote annual fluctuations as well as changes over time for both water levels and groundwater quality.

Crop Surveys. Annual Crop surveys provide data so that water demands can be better quantified. For that reason District staff annually produces crop survey maps and these maps are compiled in numerical spreadsheets so that total specific crop acreage can be calculated and summarized.

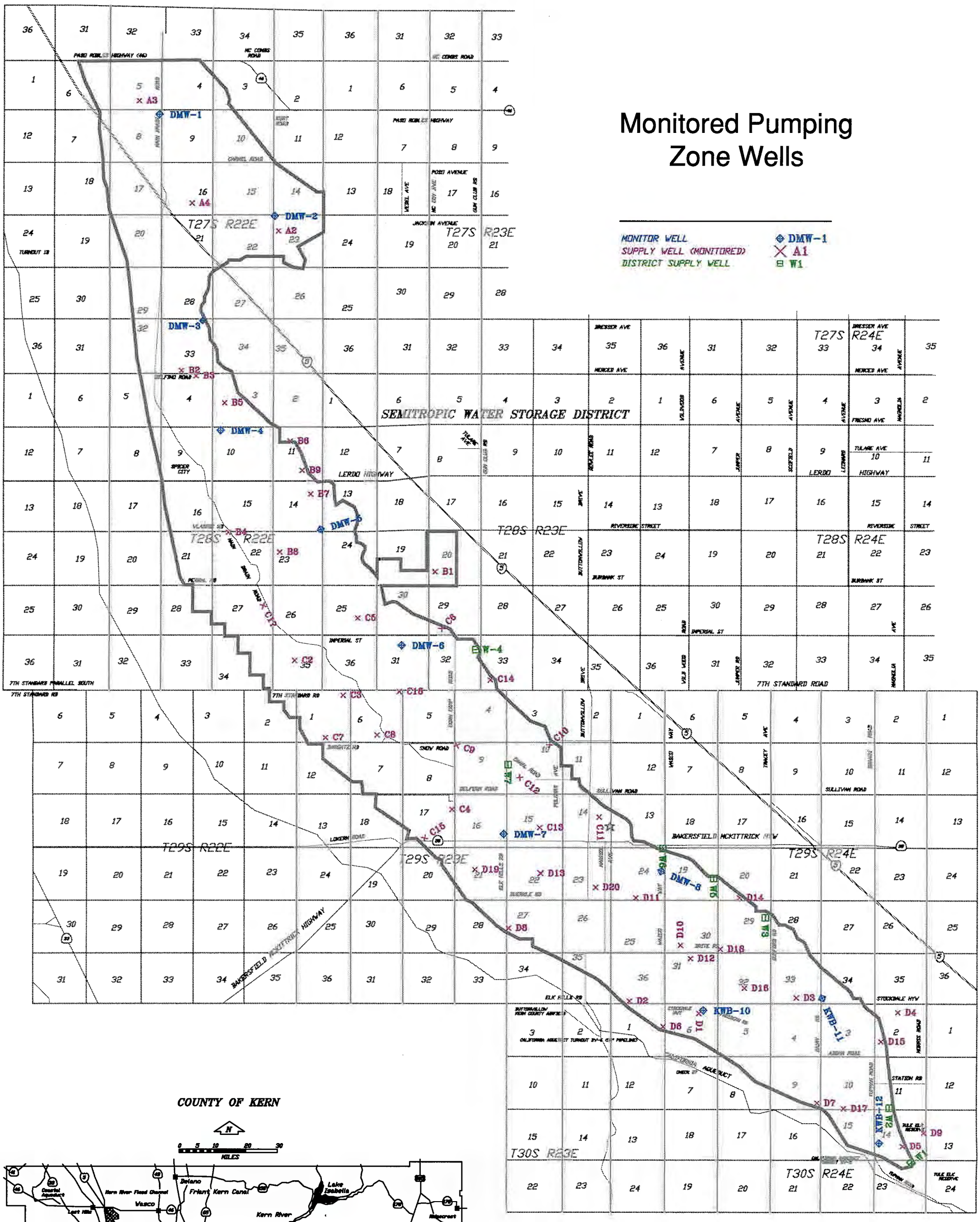
Surface Delivery Records. In part, surface delivery records are kept so that actual field delivery use can be determined. The District's Hydrography Department maintains detailed surface delivery records that show where, when, and how each acre-foot of

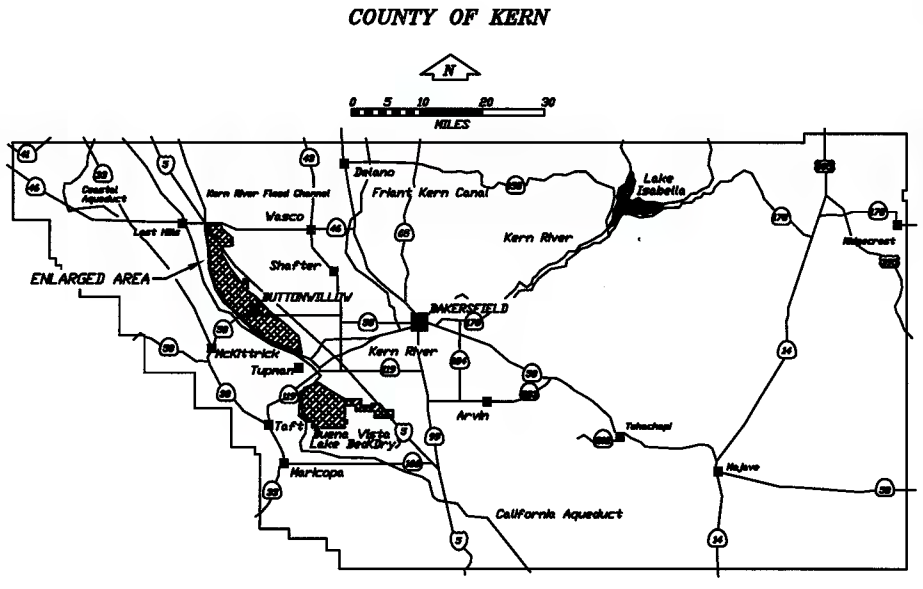
District water is utilized. Uses include such areas as: irrigation, canal losses, intentional recharge, reservoir losses, and conjunctive use programs.

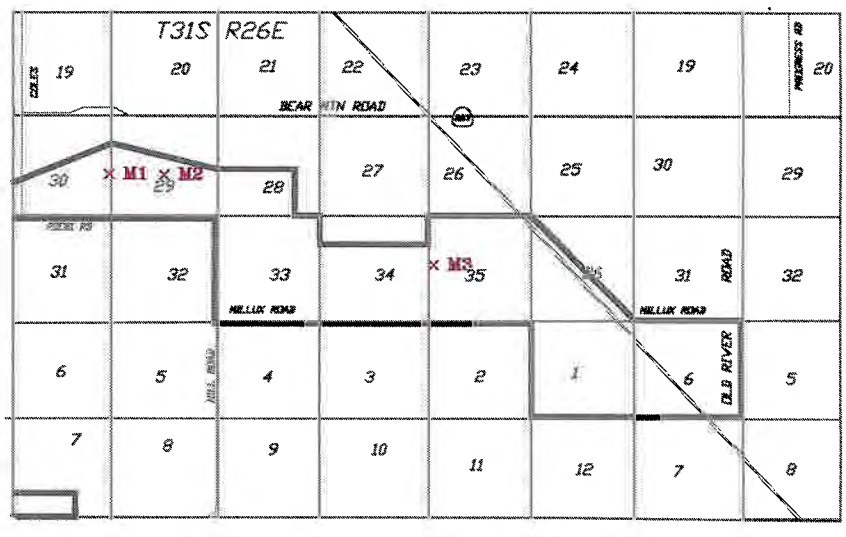
Groundwater Balance Studies. An annual groundwater balance, reflecting groundwater recharge and recovery over time, has been continually updated for the District's operations since 1970. This is done so that the District can evaluate water put into basin storage for future use in the basin for a variety of purposes as deemed appropriate by the District.

Monitored Pumping Zone Wells

MONITOR WELL — DMW-1
SUPPLY WELL (MONITORED) — A1
DISTRICT SUPPLY WELL — W1







APPENDIX C

MEMORANDUM OF UNDERSTANDING REGARDING OPERATION AND MONITORING OF THE BVWSD GROUNDWATER BANKING PROGRAM

MEMORANDUM OF UNDERSTANDING

REGARDING OPERATION AND MONITORING OF THE BUENA VISTA WATER STORAGE DISTRICT GROUNDWATER BANKING PROGRAM

This Memorandum of Understanding is entered into the Effective Date hereof by and among BUENA VISTA WATER STORAGE DISTRICT, hereinafter referred to as "Buena Vista", and SEMITROPIC WATER STORAGE DISTRICT, HENRY MILLER WATER DISTRICT, KERN COUNTY WATER AGENCY, KERN DELTA WATER DISTRICT, KERN WATER BANK AUTHORITY, ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT, and WEST KERN WATER DISTRICT, collectively referred to as "Adjoining Entities."

RECITALS

WHEREAS, Buena Vista expects that certain real property more particularly shown on the map attached hereto as Exhibit A and incorporated herein by this reference ("Project Site"), or portions thereof, will be used in connection with the Project; and

WHEREAS, Buena Vista intends to develop and improve the Project Site as necessary to permit the importation, percolation and storage of water in underground aquifers for later recovery, transportation and use for the benefit of Buena Vista, all as more fully described in Exhibit B attached hereto and incorporated herein by this reference ("Project"); and

WHEREAS, Adjoining Entities encompass lands and/or operate existing projects lying adjacent to the Project Site as shown on said Exhibit A; and

WHEREAS, in recent years, water banking, recovery and transfer programs in Kern County have become increasingly numerous and complex; and

WHEREAS, it is appropriate and desirable to mitigate or eliminate any short-term and long-term significant adverse impacts of new programs upon potentially affected projects and landowners within the boundaries of Adjoining Entities; and

WHEREAS, Adjoining Entities and Buena Vista desire that the design, operation and monitoring of the Project be conducted and coordinated in a manner to insure that the beneficial effects of the Project to Buena Vista are maximized but that the Project does not result in significant adverse impacts to water levels, water quality or land subsidence within the boundaries of Adjoining Entities, or otherwise interfere with the existing and ongoing programs of Adjoining Entities; and

WHEREAS, on October 26, 1995, the Kern Water Bank Authority and its Member Entities, as the "Project Participants," and Buena Vista Water Storage District, Rosedale-Rio Bravo Water Storage District, Kern Delta Water District, Henry Miller Water District and West Kern Water District, as the "Adjoining Entities," entered into a Memorandum of Understanding, similar to this Memorandum of Understanding, which provided among other things at Paragraph 8 that for "any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU," and by entering into this MOU the Adjoining Entities find that this MOU satisfies such requirement for the Project; and

WHEREAS, Buena Vista intends to operate its Project such that the same does not cause or contribute to overdraft of the groundwater basin; and

WHEREAS, in connection with its environmental review for the Project, Buena Vista commissioned a hydrologic balance study for the period 1962 - 2000, which study shows that the District is not currently operating in a state of overdraft, and, further, Buena Vista has projected said hydrologic balance study into the future, assuming completion of the Project, and said projection demonstrates that the District is not expected to operate in state of overdraft following implementation of the Project which studies have not been independently verified by the Adjoining Entities; and

WHEREAS, in the hydrologic balance studies conducted by Buena Vista in connection with the Project, the annual safe yield from the groundwater basin is assumed to be .3 acre-feet per acre times the gross developed acres in the District and no assumption is included with respect to groundwater inflow or outflow; and

WHEREAS, this MOU affects banking programs operated directly or indirectly for the benefit of third parties involving, (1) construction of new facilities or (2) direct or indirect sale of stored groundwater by Buena Vista, as more particularly described in Exhibit B.

NOW, THEREFORE, BE IT RESOLVED that, based upon the mutual covenants contained herein, the parties hereto agree as follows:

1. Project Description and Construction. Buena Vista has completed a preliminary Project Description described in Exhibit B hereto representing the contemplated facilities for the Project. Said preliminary description has been reviewed by the parties hereto except, however, the Adjoining Entities have not reviewed, approved or agreed to any wells located outside the existing District boundary. The

foregoing shall not be interpreted to imply consent to any aspect of any future project not described in the Environmental Impact Report, certified October 11, 2002, for the Buena Vista/Rosedale Rio Bravo Water Banking and Recovery Program. Buena Vista will construct the Project consistent with such preliminary description. Any major modifications of the facilities and/or significant changes from that described in Exhibit B and in the environmental documentation for the Project will be subject to additional environmental review pursuant to CEQA and will be subject to review of the Monitoring Committee prior to implementation.

2. Project Operation. The Project shall be operated to achieve the maximum water storage and withdrawal benefits for Buena Vista consistent with avoiding, mitigating or eliminating to the greatest extent practicable, significant adverse impacts resulting from the Project. To that end, the Project shall be operated in accordance with the following Project Objectives and Minimum Operating Criteria:

a. Project Objectives. Consistent with the Project description, Buena Vista will make a good faith effort to meet the following objectives, which may or may not be met:

(1) The parties should operate their projects in such manner as to maintain and, when possible, enhance the quality of groundwater within the Project Site and the Kern Fan Area as shown in Exhibit C.

(2) If supplies of acceptable recharge water exceed recharge capacity, all other things being equal, recharge priority should be given to the purest or best quality water.

(3) Each project within the Kern Fan Area should be operated with the objective that the average concentration of total dissolved salts in the recovered water will exceed the average concentration of total dissolved salts in the recharged water, at a minimum, by a percentage equal to or greater than the percentage of surface recharge losses. The average shall be calculated from the start of each project.

(4) To maintain or improve groundwater quality, recovery operations should extract poorer quality groundwater where practicable. Blending may be used to increase recovery of lesser quality groundwater unless doing so will exacerbate problems by generating unfavorable movement of lesser quality groundwater. It is recognized that the extent to which blending can help to resolve groundwater quality problems is limited by regulatory agency rules regarding discharges into conveyance systems used for municipal supplies, which may be changed from time to time.

(5) All groundwater pumpers should attempt to control the migration of poor quality water. Extensive monitoring will be used to identify the migration of poor quality water and give advance notice of developing problems. Problem areas may be dealt with by actions including, but not limited to:

(a) limiting or terminating extractions that tend to draw lesser quality water toward or into the usable water areas;

(b) increasing extractions in areas that might generate a beneficial, reverse gradient;

(c) increasing recharge within the usable water area to promote favorable groundwater gradients.

(6) It is intended that all recovery of recharged water be subject to the so-called "golden rule." In the context of a banking project, the "golden rule" means that, unless acceptable mitigation is provided, the banker may not operate so as to create conditions that are worse than would have prevailed absent the project giving due recognition to the benefits that may result from the project, all as more fully described at paragraph 2(b)12 below.

(7) The Project shall be developed and operated so as to prevent, eliminate or mitigate significant adverse impacts. Thus, the Project shall incorporate mitigation measures as necessary. Mitigation measures to prevent significant adverse impacts from occurring include but are not limited to the following: (i) spread out recovery area; (ii) provide buffer areas between recovery wells and neighboring overlying users; (iii) limit the monthly, seasonal, and/or annual recovery rate; (iv) provide sufficient recovery wells to allow rotation of recovery wells or the use of alternate wells; (v) provide adequate well spacing; (vi) adjust pumping rates or terminate pumping to reduce impacts, if necessary; (vii) impose time restrictions between recharge and recovery to allow for downward percolation of water to the aquifer; and (viii) provide recharge of water that would otherwise not recharge the Kern Fan Basin. Mitigation measures that compensate for unavoidable adverse impacts include but are not limited to the following: (i) with the consent of the affected groundwater pumper, lower the pump bowls or deepen wells as necessary to restore

groundwater extraction capability to such pumper; (ii) with the consent of the affected groundwater pumper, provide alternative water supplies to such pumper; and (iii) with the consent of the affected groundwater pumper, provide financial compensation to such pumper.

b. Minimum Operating Criteria.

(1) The Monitoring Committee shall be notified prior to the recharge of potentially unacceptable water, such as "produced water" from oilfield operations, reclaimed water, or the like. The Monitoring Committee shall review the proposed recharge and make recommendations respecting the same as it deems appropriate. Where approval by the Regional Water Quality Control Board is required, the issuance of such approval by said Board shall satisfy this requirement.

(2) Recharge may not occur in, on or near contaminated areas, nor may anyone spread in, on or near an adjoining area if the effect will be to mound water near enough to the contaminated area that the contaminants will be picked up and carried into the uncontaminated groundwater supply. When contaminated areas are identified within or adjacent to the Project, Buena Vista shall also:

(a) participate with other groundwater pumpers to investigate the source of the contamination;

(b) work with appropriate authorities to ensure that the entity or individual, if any, responsible for the contamination meets its responsibilities to remove the contamination and thereby return the Project Site to its full recharge and storage capacity;

(c) operate the Project in cooperation with other groundwater pumpers to attempt to eliminate the migration of contaminated water toward or into usable water quality areas.

(3) Operators of projects within the Kern Fan Area will avoid operating such projects in a fashion so as to significantly diminish the natural, normal and unavoidable recharge of water native to the Kern Fan Area as it existed in pre-project condition. If and to the extent this occurs as determined by the Monitoring Committee, the parties will cooperate to provide equivalent recharge capacity to offset such impact.

(4) The mitigation credit referenced in 2.b(12) for fallowed Project land shall be .3 acre-feet per acre per year times the amount of fallowed land included in the Project Site in the year of calculation.

(5) The District Lands shown in Exhibit A may be utilized for any purpose provided, however, the use of said property shall not cause or contribute to overdraft of the groundwater basin.

(6) Each device proposed to measure recharge water to be subsequently recovered and/or recovery of such water will be initially evaluated and periodically reviewed by the Monitoring Committee. Each measuring device shall be properly installed, calibrated, rated, monitored and maintained by and at the expense of the owner of the measuring device.

(7) It shall be the responsibility of the user to insure that all measuring devices are accurate and that the measurements are provided to the

Monitoring Committee at the time and in the manner required by the Monitoring Committee.

(8) A producer's flow deposited into another facility, such as a transportation canal, shall be measured into such facility by the operator thereof and the measurement reported to the Monitoring Committee at the time and in the manner required by such Monitoring Committee.

(9) The Monitoring Committee or its designee will maintain official records of recharge and recovery activities, which records shall be open and available to the public. The Monitoring Committee will have the right to verify the accuracy of reported information by inspection, observation or access to user records (i.e., P.G.&E. bills). The Monitoring Committee will publish or cause to be published annual reports of operations.

(10) Losses shall be assessed as follows:

(a) Surface recharge losses shall be fixed and assessed at a rate of 6% of water diverted for direct recharge.

(b) To account for all other actual or potential losses (including migration losses), a rate of 4% of water placed in a bank account (including District accounts when designated for potential sale) shall be deducted to the extent that Buena Vista has been compensated within three (3) years following the end of the calendar year in which the water was designated as banked at the SWP Delta Water Rate charged by DWR at the time of payment; provided further, however, that the water

purchased and subtracted from a groundwater bank account pursuant to this provision shall only be used for overdraft correction within the district purchasing the water.

(c) An additional 5% loss shall be assessed against any water diverted to the Project Site for banking by, for, or on behalf of any out-of-County person, entity or organization and/or against any banked water sold or transferred to any out-of-County person, entity or organization (except current SWP Agricultural Contractors).

(d) All losses provided for herein represent amounts of water that are non-bankable and non-recoverable by Buena Vista.

(11) Recovery of banked water shall be from the Project Site and recovery facilities shall be located therein. Recovery from outside the Project Site may be allowed with the consent of the District or entity having jurisdiction over the area from which the recovery will occur and upon review by the Monitoring Committee.

(12) Recovery of banked water may not be allowed if not otherwise mitigated if it will result in significant adverse impacts to surrounding overlying users. "Adverse impacts" will be evaluated using data applicable in zones including the area which may be affected by the Project of approximately five miles in width from the boundaries of the Project as designated by the Monitoring Committee. In determining "adverse impacts," as provided at this paragraph and elsewhere in this MOU, consideration will be given to the benefits accrued over time during operation of the Project to landowners surrounding the Project Site including higher groundwater levels as a result of operation of the Project. In determining non-Project conditions vs. Project

conditions, credit toward mitigation of any otherwise adverse impacts shall be recognized to the extent of the 4% loss and 5% losses recognized under paragraphs 2.b.(10)(b) and (c), for the mitigation credit recognized under paragraph 2.b.(4), if any, and to the extent of recharge on the Project Site for overdraft correction.

(13) To the extent that interference, other than insignificant interference, with the pumping lift of any existing active well as compared to non-Project conditions, is attributable to pumping of any wells on the Project Site, Buena Vista will either stop pumping as necessary to mitigate the interference or compensate the owner for such interference, or any combination thereof. The Monitoring Committee will establish the criteria necessary to determine if well interference, other than insignificant interference, is attributable to pumping of Project wells by conducting pumping tests of Project wells following the installation of monitoring wells (if not already completed) and considering hydrogeologic information.

(14) The Kern Fan Element Groundwater Model, with input from Buena Vista and the Adjoining Entities, and utilizing data from a comprehensive groundwater monitoring program, may be used by the Monitoring Committee as appropriate to estimate groundwater impacts of the Project.

(15) The Project shall be operated with a positive balance, i.e., there shall be no "borrowing" of water for recovery from the basin.

3. Project Monitoring. Adjoining Entities agree to participate in a comprehensive monitoring program and as members of a Monitoring Committee, as hereinafter more particularly described, in order to reasonably determine groundwater

level and water quality information under Project and non-Project conditions. The monitoring program will more particularly require the following:

a. Monitoring Committee: Buena Vista and the Adjoining Entities shall form a Monitoring Committee for the Project upon terms and conditions acceptable to the participants. The Monitoring Committee shall:

(1) Engage the services of a suitable independent professional groundwater specialist who shall, at the direction of the Committee, provide assistance in the performance of the tasks identified below;

(2) Meet and confer ~~monthly or at other intervals deemed to be~~ appropriate in furtherance of the monitoring program;

(3) Establish a groundwater evaluation methodology or methodologies;

(4) Prepare a monitoring plan and two associated maps, "Well Location, Water Quality Network," and "Well Location, Water Level Network," which plan and maps depict the location and types of wells anticipated to be used in the initial phase of groundwater monitoring (said plan and maps are expected to be modified from time to time as the monitoring program is developed and operated);

(5) Specify such additional monitoring wells and ancillary equipment as are deemed to be necessary or desirable for the purposes hereof;

(6) Prepare annual water balance studies and other interpretive studies, which will designate all sources of water and the use thereof within the study area;

(7) Develop criteria for determining whether excessive mounding or withdrawal is occurring or is likely to occur in an area of interest;

(8) Annually or as otherwise needed determine the impacts of the Project on each of the Adjoining Entities by evaluating with and without Project conditions; and

(9) Develop procedures, review data, and recommend Project operational criteria for the purpose of identifying, verifying, avoiding, eliminating or mitigating, to the extent practicable, the creation of significant imbalances or significant adverse impacts.

b. Collection and Sharing of Data. The Adjoining Entities will make available to the Monitoring Committee copies of all relevant groundwater level, groundwater quality, and other monitoring data currently collected and prepared by each. Buena Vista shall annually report, by areas of interest, water deliveries for banking and other purposes, groundwater withdrawals from bank accounts, transfers and other changes in account balances.

c. Monitoring Costs.

(1) The cost of constructing any necessary monitoring wells and ancillary equipment within Buena Vista shall be borne by Buena Vista. The cost of any new or additional monitoring wells and ancillary equipment outside of the boundaries of Buena Vista shall be borne as may be determined by separate agreement of Buena Vista and Adjoining Entities.

(2) Each of the parties shall be responsible for the personnel costs of its representative on the Monitoring Committee. In addition, the Adjoining Entities shall be responsible for all costs of monitoring operations and facilities within their respective boundaries and Buena Vista shall be responsible for all costs of monitoring operations and facilities within the Project Site.

(3) All other groundwater monitoring costs, including employment of the professional groundwater specialist, collection, evaluation and analyses of data as adopted by the Monitoring Committee, shall be allocated among and borne by the parties as they shall agree among themselves. Cost sharing among Adjoining Entities shall be as agreed by them. Any additional monitoring costs shall be determined and allocated by separate agreement of those parties requesting such additional monitoring.

4. Modification of Project Operations. The Monitoring Committee may make recommendations to Buena Vista, including without limitation recommendations for modifications in Project operations based upon evaluation(s) of data which indicate that excessive mounding or withdrawal is occurring or is likely to occur in an area of interest. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner.

5. Dispute Resolution.

a. Submission to Monitoring Committee. All disputes regarding the operation of the Project or the application of this MOU, or any provision hereof, shall first be submitted to the Monitoring Committee for review and analysis. The Monitoring

Committee shall meet and review all relevant data and facts regarding the dispute and, if possible, recommend a fair and equitable resolution of the dispute. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner. In the event that (1) the Monitoring Committee fails to act as herein provided, (2) any party disputes the Monitoring Committee's recommended resolution or (3) any party fails to implement the Monitoring Committee's recommended resolution within the time allowed, any party to this MOU may seek any legal or equitable remedy available as hereinafter provided.

b. Arbitration. If all of the parties agree that a factual dispute exists regarding any recommendation of the Monitoring Committee made pursuant hereto, or implementation thereof, such dispute shall, be submitted to binding arbitration before a single neutral arbitrator appointed by unanimous consent and, in the absence of such consent, appointed by the presiding judge of the Kern County Superior Court. The neutral arbitrator shall be a registered civil engineer or a registered geologist or other person acceptable to the Parties, preferably with a background in groundwater hydrology. The arbitration shall be called and conducted in accordance with such rules as the contestants shall agree upon, and, in the absence of such agreement, in accordance with the procedures set forth in California Code of Civil Procedure section 1282, et seq. Any other dispute may be pursued through a court of competent jurisdiction as otherwise provided by law.

c. Burden of Proof. In the event of arbitration or litigation under this MOU, all parties shall enjoy the benefit of such presumptions as are provided by law

but, in the absence thereof, neither party shall bear the burden of proof on any contested legal or factual issue.

d. Landowner Remedies. Nothing in this MOU shall prevent any landowner within the boundaries of any party from pursuing any remedy at law or in equity in the event such landowner is damaged as a result of projects within the Kern Fan Area.

6. Term. The Effective Date of this MOU shall be January 1, 2003 regardless of the date of actual execution. This MOU shall continue in force and effect from and after the Effective Date until terminated by (1) operation of law, (2) unanimous consent of the parties, or (3) abandonment of the Project and a determination by the Monitoring Committee that all adverse impacts have been fully eliminated or mitigated as provided in this MOU.

7. Complete Agreement/Incorporation Into Banking Agreements. This MOU constitutes the whole and complete agreement of the parties regarding Project operation, maintenance and monitoring. Buena Vista shall incorporate this MOU by reference into any further agreement it enters into respecting banking of water in or withdrawal of water from the Project Site.

8. Future Projects. With respect to any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU.

9. Notice Clause. All notices required by this MOU shall be sent via first class United States mail to the following and shall be deemed delivered three days after deposited in the mail:

Buena Vista:

Buena Vista Water Storage District (Martin Milobar)
P. O. Box 756
Buttonwillow, CA 93206

Adjoining Entities:

Kern County Water Agency (Tom Clark)
P. O. Box 58
Bakersfield, CA 93301-0058

Kern Delta Water District (Mark Mulkay)
501 Taft Highway
Bakersfield, CA 93307-6247

Semitropic Water Storage District (Wil Boschman)
P. O. Box Z
Wasco, CA 93280-0877

Henry Miller Water District (Joe Lutje)
P. O. Box 9759
Bakersfield, CA 93389-9759

Kern Water Bank Authority (Bill Phillimore)
P. O. Box 80607
Bakersfield, CA 93380-0607

Rosedale-Rio Bravo Water Storage District (Hal Crossley)
P. O. Box 867
Bakersfield, CA 93302-0867

West Kern Water District (Jerry Pearson)
P.O. Box ~~MM~~ 1105
Taft, CA 93268-~~2735~~ 1105

Notice of changes in the representative or address of a party shall be given in the same manner.

10. California Law Clause. All provisions of this MOU and all rights and obligations of the parties hereto shall be interpreted and construed according to the laws of the State of California.

11. Amendments. This MOU may be amended by written instrument executed by all of the parties. In addition, recognizing that the parties may not now be able to contemplate all the implications of the Project, the parties agree that on the tenth anniversary of implementation of the Project, if facts and conditions not envisioned at the time of entering into this MOU are present, the parties will negotiate in good faith amendments to this MOU. If the parties cannot agree on whether conditions have changed necessitating an amendment and/or upon appropriate amendments to the MOU, such limited issues shall be submitted to an arbitrator or court, as the case may be, as provided above.

12. Successors and Assigns. This MOU shall bind and inure to the benefit of the successors and assigns of the parties.

13. Severability. The rights and privileges set forth in this MOU are severable and the failure or invalidity of any particular provision of this MOU shall not invalidate the other provisions of this MOU; rather all other provisions of this MOU shall continue and remain in full force and effect notwithstanding such partial failure or invalidity.

14. Force Majeure. All obligations of the parties shall be suspended for so long as and to the extent the performance thereof is prevented, directly or indirectly, by earthquakes, fires, tornadoes, facility failures, floods, drownings, strikes, other casualties, acts of God, orders of court or governmental agencies having competent

jurisdiction, or other events or causes beyond the control of the parties. In no event shall any liability accrue against a party, or its officers, agents or employees, for any damage arising out of or connected with a suspension of performance pursuant to this paragraph.

15. Counterparts. This MOU, and any amendment or supplement thereto, may be executed in two or more counterparts, and by each party on a separate counterpart, each of which, when executed and delivered, shall be an original and all of which together shall constitute one instrument, with the same force and effect as though all signatures appeared on a single document. In proving this MOU or any such amendment, supplement, document or instrument, it shall not be necessary to produce or account for more than one counterpart thereof signed by the party against whom enforcement is sought.

IN WITNESS WHEREOF the parties have executed this MOU the day and year first above written at Bakersfield, California.

BUENA VISTA WATER STORAGE DISTRICT

By: William Hawkins

By:_____

SEMITROPIC WATER STORAGE DISTRICT

By:

By: Gen. Mgr.

HENRY MILLER WATER DISTRICT

By: _____

By: Joe Lutje

KERN COUNTY WATER AGENCY

By: Adrienne Mathews

By: _____

KERN DELTA WATER DISTRICT

By: _____

By: L. Mark Mulkay

KERN WATER BANK AUTHORITY

By: _____

By: William Phillimore

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

BY: _____

BY: Hal Crossley

WEST KERN WATER DISTRICT

BY: _____

BY: _____

REQUIRED ATTACHMENTS:

EXHIBIT A:	MAP OF DISTRICT
EXHIBIT B:	NARRATIVE DESCRIPTION OF PROJECT FACILITIES
EXHIBIT C:	MAP OF KERN FAN AREA

banking MOU.wpd

HENRY MILLER WATER DISTRICT

By:_____

By:_____

KERN COUNTY WATER AGENCY

By:_____

By:_____

KERN WATER BANK AUTHORITY

By:_____

By:_____

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

BY:_____

BY:_____

WEST KERN WATER DISTRICT

BY:_____

BY:_____

EXHIBIT A

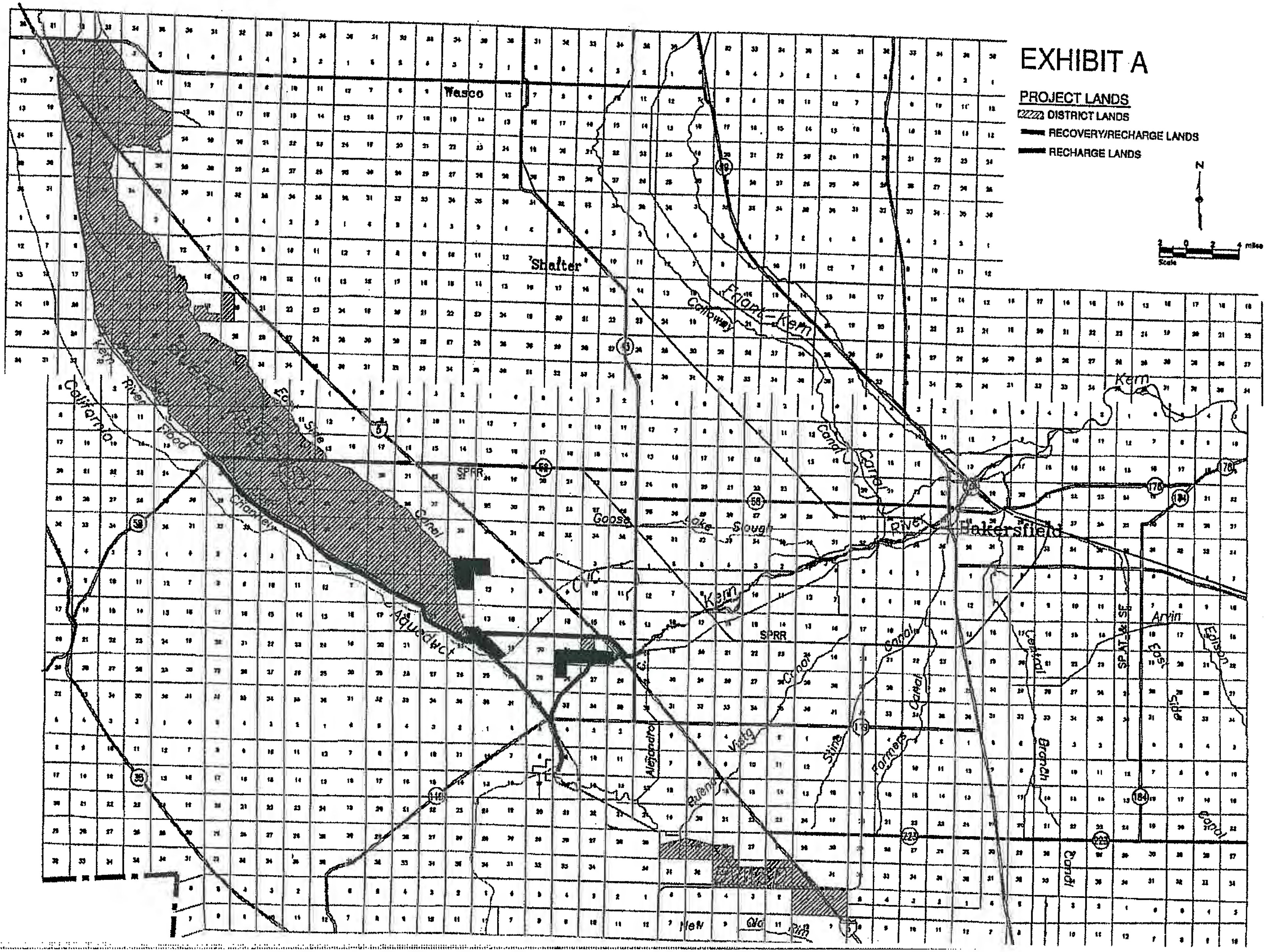

PROJECT LANDS
DISTRICT LANDS
RECOVERY/RECHARGE LANDS
RECHARGE LANDS
N
Scale
miles
Wasco
Shafter
Bakersfield
Arvin
Friant-Kern
Calloway
Canal
Kern
River
California
Aqueduct
East Side
Canal
Goose Lake Slough
SPRR
Alejandro
Buena Vista
Stine
Farmers
Central
Branch
East Side
Edison
Canal
Kern River Flood
Old River
New Rim

EXHIBIT B

PROJECT DESCRIPTION

Purposes

The primary water management objective of Buena Vista Water Storage District (Buena Vista) is to enhance water supplies for its landowners. Under the project, surface water will be stored in aquifers during times of surplus and recovered when needed either through district or landowner wells. Through its ongoing conjunctive use program, the District has stored, and will continue to store more water that can be beneficially used by its landowners. The new project involves the continuation and expansion of the conjunctive use program and the sale of a portion of its stored water that is surplus to its long-term needs.

Sources of Water

Kern River water, being Buena Vista WSD's primary supply water right, as well as other sources will be recharged. Such sources include: the Kern River, Friant-Kern, SWP, CVP, flood water and other sources that may be available from time to time.

Buena Vista has assessed its water needs for irrigation, its available water sources, and the amount of direct and in-lieu recharge that can occur effectively (i.e. be recovered and still be consistent with this MOU). It has concluded that at least 30,000 acre feet, as a long term average, is effective recharge that is surplus to its needs and can be recovered either directly, or through exchange of Buena Vista's SWP entitlement. Therefore, Buena Vista plans to sell a portion of its surplus water inside and/or outside the county.

Facilities

Buena Vista has historically recharged water on Project Lands as shown on Exhibit A. Recharge has also occurred through the delivery of surface water to landowners who would otherwise pump groundwater on "District Lands" and "Recovery/Recharge Lands" outside the District's boundaries. These activities will continue and may be expanded.

Of the approximately 50,000 acres that presently constitute Buena Vista "District Lands", all may be used for in-lieu recharge and some areas are suitable for direct recharge. In addition, the "Recharge Lands" and "Recovery/Recharge Lands" identified on Exhibit A may also be used for in-lieu and direct recharge.

It is proposed that water would be conveyed to and from project facilities using available capacity in any of the canals and conveyance facilities that may serve the Project including: the Cross Valley Canal, the River Canal, the Kern River, the Friant Kern Canal, the California Aqueduct, the Alejandro Canal, and the Main Canal/KWB Canal. Additional conveyance facilities may be constructed as future projects are developed.

Buena Vista may construct additional recharge ponds, water conveyance facilities, and water wells. Currently the District has four District owned wells within the Buttonwillow service area. According to a 2000 survey, there are approximately 200 landowner wells. Another 20 District owned wells may be added within the "District Lands" and "Recovery/Recharge Lands" as shown on Exhibit A before the project is complete to provide adequate recovery capacity and the necessary operational flexibility to avoid or minimize adverse impacts. District/Landowner programs may include the use of landowner wells by District-wide reduction in surface supply allocations or by individual volunteer well lease programs. Once build out of the recovery facilities is complete, the recovery capacity will be maintained by constructing new wells to replace the capacity of older wells as they fail. New District owned wells shall be placed no

closer than one-third mile from any functioning wells outside the project boundaries. Project wells shall be located and operated so as to prevent significant non-mitigable adverse impacts to neighboring landowners.

Operation

The project shall be managed by the Buena Vista Water Storage District. Day-to-day operation of portions of the project may be contracted to other parties. Operation of the project shall be coordinated with adjoining projects.

Buena Vista has historically managed its groundwater and surface supplies to protect water users within the District and assure an affordable water supply of sufficient quality and quantity to meet future needs. This Project will not alter that mission. The District will maintain a groundwater storage account considered adequate to ensure that the District will have sufficient water in storage to meet its continuing in-district needs.

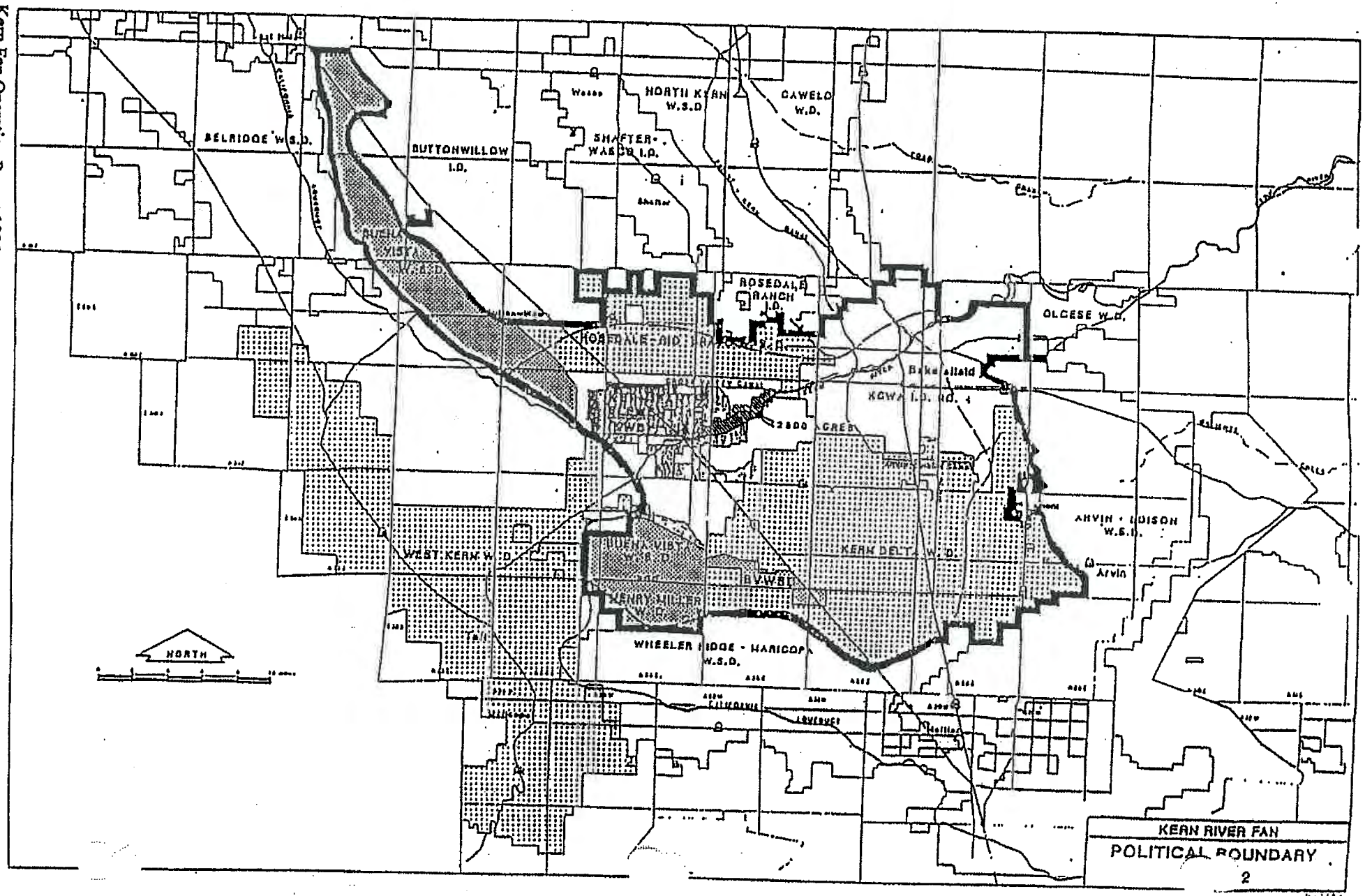

BELRIDGE W.S.D.
BUTTONWILLOW I.D.
NORTH KERN W.S.D.
CAWELO W.D.
SHAFTER-WASCO I.D.
BUENA VISTA W.S.D.
ROSEDALE RANCH I.D.
ROSEDALE-ARVIN
OLCESE W.D.
Bakersfield
KCWA I.D. NO. 4
ARVIN - EDISON W.S.D.
Arvin
WEST KERN W.D.
BUENA VISTA W.S.D.
KERN DELTA W.D.
BVWSD
HENRY MILLER W.D.
WHEELER RIDGE - MARICOPA W.S.D.
NORTH
KERN RIVER FAN
POLITICAL BOUNDARY
2

EXHIBIT C

APPENDIX D

BVWSD WATER MANAGEMENT PROGRAM PROJECT SUMMARY MATRIX

BUENA VISTA WATER STORAGE DISTRICT
WATER MANAGEMENT PROGRAM
PROJECT SUMMARY MATRIX

Financial (1)

Program/Project	Projected Capital Cost $ Millions	Projected Annual Capital Cost $ Millions	Projected Annual O&M Cost $ Millions	Projected Total Annual Cost $ Millions	Annual Project Water Supply/ Project Yield (AF/yr)	Average Unit Cost $/AF/Yr	Score (out of 100)
Unbalanced Exchange Programs	0	0.0	0.0	0.0	0-15,000	0	0
Outlet Canal Dry-Year Reoperation	2-3	0.2	0.1	0.3	6,000-9,000	40	11
WRP Conservation Easement Water Buyback	0.0	0.0	0.3	0.3	2,000-5,000	71	20
Outlet Canal Lining	6	0.5	0.1	0.7	8000-10000	78	22
BV GW Recharge & Recovery	0.3	0.0	0-2.0	1.0	0-30,000	67	19
On-Farm Water Use Efficiency Project	5	0.4	0.0	0.4	2,000-5,000	114	32
BW Service Area System Improvements (Canal Lining)	3	0.2	0.1	0.4	3500	114	32
WRP Conservation Easement Land Purchase	2-5	0.2-0.4	0.2	0.5	2,000-5,000	143	40
Kern Fan Direct Recharge & Recovery	10-12	0.8-1.0	0.1-0.6	1.4	0-10,000	280	78
Off-Stream Storage Reclamation (North End Reservoir)	5	0.4	0.1	0.5	1,000-2,000	333	93
10-25% Rotational Fallowing	0	0.0	2.8-7	5.0	5,000-25,000	357	100
75-100% Permanent Fallowing	0	0.0	21-28	25.0	75,000-200,000	333	93

Complexity/Difficulty

Program/Project	Source of Supply							BV Policies				
	Kern River (Surface)	SWP (Surface)	SWP (Exchange)	Tailwater	Kern River (GW)	SWP (GW)	Score (out of 100)	"Use It or Lose It"	Lasee Issues	Administrative	M & O	Score (out of 100)
Relative Difficulty Factor:	1	1	1	1	1	1		1	1	1	1	
Unbalanced Exchange Programs	7	8	5				33			2		5
Outlet Canal Dry-Year Reoperation	7	8	5				33			2	1	8
WRP Conservation Easement Water Buyback	7	8	5				33	5	4	3	1	33
Outlet Canal Lining	7	8	5				33			2	1	8
BV GW Recharge & Recovery	7	8	5		5	5	50		3	3	5	28
On-Farm Water Use Efficiency Project	7	8	5				33	3	6	8	1	45
BW Service Area System Improvements (Canal Lining)	7	8	5				33			2	1	8
WRP Conservation Easement Land Purchase	7	8	5				20	5	4	8	5	28
Kern Fan Direct Recharge & Recovery	7				5		20		3	3	5	28
Off-Stream Storage Reclamation (North End Reservoir)				2			3			3	5	20
10-25% Rotational Fallowing	7	8	5				33	5	4	8	2	48
75-100% Permanent Fallowing	9	8	5				37	8	10	8	6	80

Program/Project	Adjoining Entities Issues							Legal				
	RRBWSD	KCWA	KWBA	WKWD	HMWD	STWSD	Score (out of 100)	Water Rights	MOU	Contract Negotiation	Litigation	Score (out of 100)
Relative Difficulty Factor:	1	1	1	1	1	1		2	1	2	5	
Unbalanced Exchange Programs	1	4	2	4	1	4	27	5	1	5	1	26
Outlet Canal Dry-Year Reoperation	1	6	2	2	1	4	27	5	1	5	2	31
WRP Conservation Easement Water Buyback	1	4	2	4	1	4	27	8	1	5	5	52
Outlet Canal Lining	1	6	2	2	1	4	27	5	1	5	2	31
BV GW Recharge & Recovery	1	6	6	4	1	6	40	8	5	5	5	56
On-Farm Water Use Efficiency Project	1	4	2	4	1	4	27	5	1	6	1	28
BW Service Area System Improvements (Canal Lining)	1	6	2	2	1	4	27	5	1	5	2	31
WRP Conservation Easement Land Purchase	1	4	2	4	1	4	45	8	1	5	5	56
Kern Fan Direct Recharge & Recovery	4	6	6	4	1	6	45	8	5	5	5	56
Off-Stream Storage Reclamation (North End Reservoir)	1	4	2	4	1	4	27	5	1	5	1	26
10-25% Rotational Fallowing	1	6	4	4	1	6	37	8	1	6	6	59
75-100% Permanent Fallowing	1	8	8	8	6	8	65	9	1	8	8	75

Program/Project	Environmental Factors							CEQA (2)				
	Water Quality	Water Levels	ESA - Species	ESA - Habitat	Wetlands	Economic Impacts	Score (out of 100)	Categorical Exemption	Negative Declaration	Mitigated Neg. Dec.	Environmental Impact Report	Score (out of 100)
Relative Difficulty Factor:	1	2	2	1	1	1		2	6	7	10	
Unbalanced Exchange Programs	3	3					11		4			10
Outlet Canal Dry-Year Reoperation	3	3	5	5	5		36			6		17
WRP Conservation Easement Water Buyback	3	2	3	3	3	3	28			6		17
Outlet Canal Lining	3	3	8	8	8		51			6		17
BV GW Recharge & Recovery	5	5					19				6	24
On-Farm Water Use Efficiency Project	3	2					9		4			10
BW Service Area System Improvements (Canal Lining)	3	3	5	5	5		36			6		17
WRP Conservation Easement Land Purchase	3	2	3	3	3	3	19			6		24
Kern Fan Direct Recharge & Recovery	5	5					19				6	24
Off-Stream Storage Reclamation (North End Reservoir)	5	5	3	3	3	2	36			5		14
10-25% Rotational Fallowing	3	2	3	3		4	25			6		17
75-100% Permanent Fallowing	8	8	3	3	3	8	55				8	32

Program/Project	Permitting / Approval												
	USACOE - 404	USFWS	CDFG - 1601	CDFG - Incidental Take	CRWQCB - 401 WQC	SWRCB - Water Rights	CDWR - SWP	CDWR - Dam Safety	KCWA	KC Supervisors	CalTrans	Kern County Road Dept.	Score (out of 100)
Relative Difficulty Factor:	1	1	1	1	1	1	1	1	1	1	1	1	
Unbalanced Exchange Programs						2	3		2				6
Outlet Canal Dry-Year Reoperation		8		8		5	3		5				24
WRP Conservation Easement Water Buyback		5		5		5	3		5	3			22
Outlet Canal Lining		8		8		5	3		5				24
BV GW Recharge & Recovery						2	3		5				8
On-Farm Water Use Efficiency Project						2	3		5		5	5	17
BW Service Area System Improvements (Canal Lining)		8		8		5	3		5				24
WRP Conservation Easement Land Purchase		5		5		5	3		5	3			8
Kern Fan Direct Recharge & Recovery						2	3		5				8
Off-Stream Storage Reclamation (North End Reservoir)		5		5		2	3	5	3				19
10-25% Rotational Fallowing		5		5		5	3		5	5			23
75-100% Permanent Fallowing		5		5		5	3		8	8			28

Program/Project	Project Development											
	Land Acquisition	Sitework/Design	Conveyance Facilities	Recharge Facilities	Recovery Facilities	Score (out of 100)	Overall Score – Complexity (Out of 1000)	Ranking (Complexity)	Overall Score – Financial (Out of 1000)	Ranking (Financial)	Overall Score – Combined (Out of 1000)	Ranking (Combined)
Relative Difficulty Factor:	1	1	1	1	1							
Unbalanced Exchange Programs						0	147	1	3	1	75	1
Outlet Canal Dry-Year Reoperation	5	5	5			30	271	3	112	2	192	2
WRP Conservation Easement Water Buyback						0	288	6	200	4	244	3
Outlet Canal Lining		7				14	283	5	218	5	250	4
BV GW Recharge & Recovery					5	10	317	7	187	3	252	5
On-Farm Water Use Efficiency Project						0	250	2	320	6	285	6
BW Service Area System Improvements (Canal Lining)		5				10	272	4	320	6	296	7
WRP Conservation Easement Land Purchase						50	362	9	400	7	381	8
Kern Fan Direct Recharge & Recovery	5	5	5	5	5	50	410	10	784	8	597	9
Off-Stream Storage Reclamation (North End Reservoir)	5	5	5			30	336	8	933	9	635	10
10-25% Rotational Fallowing						0	427	11	1000	10	714	11
75-100% Permanent Fallowing						0	582	12	933	11	758	12

EXPLANATION

- The left-hand portion of the table contains a financial analysis of the projects, and the right-hand portion of the table contains a complexity/difficulty analysis of the projects broken down by categories of issues.

'- The financial score shown on the left represents a ranking of the projects based on average unit cost per acre-foot, on a scale of 0 to 100. The numbers represent the percentage value of the cost per acre-foot of each project relative to the cost per acre-foot of the most expensive project.

- The individual scores in the complexity/difficulty section represent the level of effort required to complete the item for each project on a scale from 0 to 10; with 0 being non-existant, 1 being easy, and 10 being most difficult. Individual scores, weighted by the Relative Difficulty Factor assigned to each item, are summed for each category of items and adjusted so that each category score is on a scale of 0 to 100.

- The Relative Difficulty Factors are all set to 1 within a category when the items in that category are all roughly equivalent in terms of generic complexity/difficulty. They are set to different numbers within a category when items in that category have different levels of generic complexity/difficulty. For example, within the CEQA category, an EIR is much more complex/difficult than a Negative Declaration, but the complexity/difficulty of an EIR may also vary depending on the specifics of the individual project.

- Overall scores are based on a summation of different groupings of category scores, and adjusted so that each overall score is on a scale of 0 to 1000. "Overall Score-Complexity" considers only the non-financial scores. "Overall Score-Financial" is the same financial score as on the left, but adjusted for a scale of 0 to 1000. "Overall Score-Combined" is simply the arithmetic average of the Overall Complexity and Financial Scores.

- The lowest scores are the most likely to succeed in a cost-effective manner, and should receive the highest priority.

NOTES:

1. Financial estimates by BVWSD staff.
2. Scores shown for CEQA represent level of effort for project implemented alone, not in combination with other projects. Final CEQA effort will be aggregate.

DFS/blt
C578/eval-matrix 2-5-08.xls

Spreadsheet designed by Krieger & Stewart, Incorporated
February 2008

APPENDIX E

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT, NOTICE OF COMPLETION AND ENVIRONMENTAL DOCUMENT TRANSMITTAL FORM AND ATTACHMENTS

NOTICE OF COMPLETION & ENVIRONMENTAL DOCUMENT TRANSMITTAL

SCH No.: _____

For U.S. Mail: State Clearinghouse, PO Box 3044, Sacramento, CA 95812-3044
For Hand Delivery and Overnight Delivery/Street Address: 1400 Tenth Street, Room 222, Sacramento, CA 95812
(916) 445-0613

PROJECT TITLE Buena Vista Water Management Program		
LEAD AGENCY Buena Vista Water Storage District	CONTACT PERSON Dan Bartel, Engineer-Manager	
STREET ADDRESS 525 North Main Street	TELEPHONE (661) 324-1101	
CITY Buttonwillow	ZIP CODE 93206	COUNTY Kern

PROJECT LOCATION

COUNTY Kern	CITY/NEAREST COMMUNITY Buttonwillow		
CROSS STREETS N/A	ZIP CODE 93206	TOTAL ACRES N/A	LATITUDE / LONGITUDE 35°23.57' 48" N 119° 28' 26.47" W
ASSESSOR'S PARCEL NO. N/A	SECTION, TOWNSHIP, RANGE Maples Service Area Sections 28, 29, 30, 33, 34, 35, 36; Township 31 S; Range 26 E Section 1, Township 32 S, Range 26 E Section 6, Township 32 S, Range 27 E Buttonwillow Service Area Sections 2, 3, 4, 5, 6, 8, 9, 10, 11, 14, 15, 23; Township 30 S; Range 24 E Section 1, Township 30 S, Range 23 E Sections 19, 20, 28, 29, 30, 31, 32, 33, 34; Township 29 S, Range 24 E Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34, 35, 36; Township 29 S; Range 23 E Sections 1, 2, 12; Township 29 S; Range 23 E Sections 19, 20, 29, 30, 31, 32, 33; Township 28 S; Range 23 E Sections 2, 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 34, 35, 36; Township 28 S; Range 22 E Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, 21, 22, 23, 26, 27, 28, 29, 32, 33, 34; Township 27 S; Range 22 E		BASE MDM
WITHIN 2 MILES: Interstate 215; State Highway Nos. 43, 58, 99, 119, 223	WITHIN 2 MILES: WATERWAYS California Aqueduct, Kern River Flood Channel, Outlet Canal, Short Main Canal, Buena Vista Aquatic Recreation Area, and many other canals and ditches.		
WITHIN 2 MILES: AIRPORTS Buttonwillow-Kern County Airfield	WITHIN 2 MILES: RAILWAYS Union Pacific Railroad	WITHIN 2 MILES: SCHOOLS Buttonwillow Elementary School 400 McKittrick Highway Buttonwillow CA 93206	

DOCUMENT TYPE

CEQA				NEPA		OTHER	
☒	NOP	☐	Supplement to EIR	☐	NOI	☐	Joint Document
☐	Early Cons	☐	Subsequent EIR	☐	EA	☐	Final Document
☐	Draft Neg Dec	☐	(Prior SCH No.):	☐	Draft EIS	☐	Other:
☐	Mit Neg Dec	☐	Other:	☐	FONSI		
☐	Draft EIR						

LOCAL ACTION TYPE

☐	General Plan Update	☐	Specific Plan	☐	Rezone	☐	Annexation
☐	General Plan Amendment	☐	Master Plan	☐	Prezone	☐	Redevelopment
☐	General Plan Element	☐	Planned Unit Development	☐	Use Permit	☐	Coastal Permit
☐	Community Plan	☐	Site Plan	☐	Land Division (Subdivision, etc.)	☒	Other: Water Management Program

DEVELOPMENT TYPE

☐	Residential:	Units:	Acres:		☒	Water Facilities:	Type: Water recovery wells and brackish water conveyance pipelines	GPM:
☐	Office:	Sq. ft.	Acres:	Employees:	☐	Transportation:	Type:	
☐	Commercial:	Sq. ft.	Acres:	Employees:	☐	Mining:	Mineral:	
☐	Industrial:	Sq. ft.	Acres:	Employees:	☐	Power:	Type:	MW:
☐	Educational:				☐	Waste Treatment:	Type:	
☐	Recreational:				☐	Hazardous Waste:	Type:	
					☐	Other:		

PROJECT ISSUES THAT MAY HAVE A SIGNIFICANT OR POTENTIALLY SIGNIFICANT IMPACT:

☐	Aesthetic/Visual	☐	Geologic/Seismic	☐	Toxic/Hazardous
☐	Agricultural Land	☐	Minerals	☐	Traffic/Circulation
☐	Air Quality	☐	Noise	☐	Vegetation
☐	Archaeological/Historical	☐	Population/Housing Balance	☐	Water Quality
☒	Biological Resources	☐	Public Services/Facilities	☒	Water Supply/Groundwater
☐	Coastal Zone	☐	Recreation/Parks	☐	Wetland/Riparian
☐	Drainage/Absorption	☐	Schools/Universities	☐	Wildlife
☐	Economic/Jobs	☐	Septic Systems	☐	Growth Inducement
☐	Fiscal	☐	Sewer Capacity	☐	Land Use
☐	Flood Plain/Flooding	☐	Soil Erosion/Compaction/Grading	☒	Cumulative Effects
☐	Forest Land/Fire Hazard	☐	Solid Waste	☐	Other:

PRESENT LAND USE/ZONING/GENERAL PLAN USE DESIGNATION:

The present land use, zoning, and general plan land use designations for Buena Vista Water Storage District's Service Area are primarily agricultural, with some residential.

PROJECT DESCRIPTION *(please use a separate page if necessary)*

The Buena Vista Water Management Program consists of four project components designed to more effectively and beneficially manage the District's water resources. Said components are described in detail in Attachment A to the Notice of Preparation, which is attached herewith.

Reviewing Agencies Checklist *Appendix C*

KEY: S = Document sent by lead agency
X = Document sent by SCH
T = Suggested distribution

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below:

	Air Resources Board		Native American Heritage Commission
	Boating & Waterways, Department of		Office of Emergency Services
	California Highway Patrol		Office of Historic Preservation
	Caltrans District #____		Parks & Recreation
	Caltrans Division of Aeronautics		Pesticide Regulation, Department of
	Caltrans Planning		Public Utilities Commission
	Coachella Valley Mountains Conservancy		Reclamation Board
	Coastal Commission		Regional Water Quality Board No.: _____ Resources Agency
	Colorado River Board		S.F. Bay Conservation & Development Commission
	Conservation, Department of		San Gabriel & Lower Los Angeles Rivers & Mountains Conservancy
	Corrections, Department of		San Joaquin River Conservancy
	Delta Protection Commission		Santa Monica Mountains Conservancy
	Education, Department of		State Lands Commission
	Office of Public School Construction		SWRCB: Clean Water Grants
S	Energy Commission		SWRCB: Water Quality
S	Fish & Game Region # 4		SWRCB: Water Rights
	Food & Agriculture, Department of		Tahoe Regional Planning Agency
	Forestry & Fire Protection		Toxic Substances Control, Department of
	General Services, Department of	S	Water Resources, Department of
	Health Services, Department of	S	Other: United States Fish and Wildlife Service
	Housing & Community Development		Other:
	Integrated Waste Management Board		

Local Public Review Period (to be filled in by lead agency):

Starting Date: _____ Ending Date: _____

Lead Agency (Complete if applicable):

Consulting Firm: Krieger & Stewart

Address: 3602 University Avenue

City/State/Zip: Riverside, CA 92501

Contact: David F. Scriven

Phone: (951) 684-6900

Applicant: Buena Vista Water Storage District

Address: 525 North Main Street

City/State/Zip: Buttonwillow, California 93206

Phone: (661) 324-1101

Signature of Lead Agency Representative: _____ Date: 1/6/08

For SCH Use Only:

Date Received at SCH _____
Date Review Starts _____
Date to Agencies _____
Date to SCH _____
Clearance Date _____
Notes:

MEMORANDUM

TO: INTERESTED PARTIES **FILE:** 578-8.2

FROM: BUENA VISTA WATER STORAGE DISTRICT **DATE:** 01/07/2009

SUBJECT: BUENA VISTA WATER MANAGEMENT PROGRAM
NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT

The attached Notice of Preparation was distributed directly to responsible agencies and other interested parties on November 25, 2008, and a scoping meeting was held on December 12, 2008.

If additional interest is generated by this memorandum, then Buena Vista Water Storage District will schedule an additional scoping meeting.

Please send your response at the earliest possible date, but not later than 30 days after receipt of this memorandum. Submit all responses to:

Buena Vista Water Storage District

P.O. Box 756

Buttonwillow CA 93206

vem/

NOTICE OF PREPARATION

TO: See Distribution List
(Responsible Agency or Trustee Agency)

(Address)

FROM: Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report.

The Buena Vista Water Storage District will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The Project description, location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study ___ is _√_ is not attached.

Your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice. Please send your response to Buena Vista Water Storage District at the address shown above. We will need the name for a contact person in your agency.

PROJECT TITLE: Buena Vista Water Management Program
PROJECT LOCATION: Buena Vista Water Storage District Service Area and Vicinity (see Exhibit B)
PROJECT DESCRIPTION (brief): The Buena Vista Water Management Program consists of four project components designed to more effectively and beneficially manage the District's water resources. Said components are described on the attached Exhibit A.
PROJECT APPLICANT, IF ANY: Buena Vista Water Storage District
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY HAZARDOUS WASTE LIST (if applicable): N/A

A **SCOPING MEETING** will be held by the Lead Agency at the time, date, and location shown below:

TIME: 10:00 a.m.
DATE: December 12, 2008
LOCATION: 525 North Main Street, Buttonwillow, CA 93206

Date: 11-25-08

Signature D. W. BJ
Title District Engineer-Manager
Telephone (661) 324-1101

Consulting firm retained to prepare draft EIR (if applicable):

Name: Krieger & Stewart
Address: 3602 University Avenue
City/State/Zip: Riverside, CA 92501
Contact Person: David F. Scriven

NOTICE OF PREPARATION

TO: See Distribution List
(Responsible Agency or Trustee Agency)

(Address)

FROM: Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report.

The Buena Vista Water Storage District will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The Project description, location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study ___ is √ is not attached.

Your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice. Please send your response to Buena Vista Water Storage District at the address shown above. We will need the name for a contact person in your agency.

PROJECT TITLE: Buena Vista Water Management Program
PROJECT LOCATION: Buena Vista Water Storage District Service Area and Vicinity (see Exhibit B)
PROJECT DESCRIPTION (brief): The Buena Vista Water Management Program consists of four project components designed to more effectively and beneficially manage the District's water resources. Said components are described on the attached Exhibit A.
PROJECT APPLICANT, IF ANY: Buena Vista Water Storage District
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY HAZARDOUS WASTE LIST (if applicable): N/A

A **SCOPING MEETING** will be held by the Lead Agency at the time, date, and location shown below:

TIME: 10:00 a.m.
DATE: December 12, 2008
LOCATION: 525 North Main Street, Buttonwillow, CA 93206

Date: 11-25-08

Signature D. W. BJ
Title District Engineer-Manager
Telephone (661) 324-1101

Consulting firm retained to prepare draft EIR (if applicable):

Name: Krieger & Stewart
Address: 3602 University Avenue
City/State/Zip: Riverside, CA 92501
Contact Person: David F. Scriven

EXHIBIT A

BUENA VISTA WATER STORAGE DISTRICT
BUENA VISTA WATER MANAGEMENT PROGRAM
PROGRAM DESCRIPTION

The primary water management objective of the Buena Vista Water Storage District (BVWSD) is to benefit the lands, landowners, and water users within its boundaries through a more economic and efficient distribution and use of available water supplies. In 2007, Court decisions greatly impacted the ability of the State Water Project and Central Valley Project to conduct Delta pumping operations for their contract holders, which, combined with drought conditions, has thrust California into a water supply crisis. In an effort to better maximize the benefits of District assets and creatively assist other water users, the District is considering the implementation of the Buena Vista Water Management Program (Program) which consists of four components designed to more effectively and beneficially manage the District's water resources and facilities. Said components are listed and described below. BVWSD's Water Management Program consists of implementing some or all of the following components.

COMPONENT 1:	Groundwater Recharge and Recovery Project (GRRP)
COMPONENT 2:	Water Exchange Project (WEP)
COMPONENT 3:	Conservation Easement Water Acquisition and Management Project (CEWAMP)
COMPONENT 4:	Brackish Ground Water Remediation Project (BGRP)

COMPONENT 1: Groundwater Recharge and Recovery Project (GRRP)

BVWSD has historically stored water in the underlying ground water basin. In addition to the District's existing ground water banking programs, the GRRP will store water within, and recover the additional stored ground water from, the ground water basin.

The GRRP consists of ground water recharge that will be conducted through direct recharge methods, in-lieu methods, or a combination of these. The District has conducted and will continue to conduct direct recharge by delivering surface water to the ground water basin via canal seepage, recharge ponds, and irrigation deep percolation. Total District ground water replenishment exceeds total District ground water extraction by an annual average of approximately 47,000 acre-feet per year (AF/Yr).

BVWSD currently has 7 District-owned recovery wells within the Buttonwillow Service Area. According to a 2005 survey, there are approximately 200 landowner wells within District boundaries. The GRRP includes the

addition of up to 20 District-owned recovery wells over the life of the Project in order to provide adequate recovery capacity and necessary operational flexibility.

The GRRP ground water recovery may include the use of District wells, the indirect use of landowner wells throughout the District via reductions in surface water supply allocations or via the use of individual volunteer landowner wells pursuant to agreements with the District, or via the use of other wells within the Program Vicinity. The GRRP's ultimate additional annual recovery above existing conjunctive-use and project demand is estimated to be approximately 20,000 AF/Yr, and the District will manage resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.

COMPONENT 2: Water Exchange Project (WEP)

BVWSD's Water Exchange Project (WEP) will allow the District to deliver portions of its water supplies to other water suppliers in exchange for the later return of more regulated (less varied) water supplies. Because of the District's rights on the Kern River, the District has access to large quantities of water supplies in wet years. Historically, the District has utilized methods for using and storing its wet-year supplies for later use. One such commonly used method is the "exchange." In an exchange, the District delivers a portion of its surplus wet-year supplies to another agency. The other agency later returns a predetermined or negotiated quantity of its regulated water to the District, with or without an additional financial consideration. The WEP will ultimately allow the District to better manage its water supplies by increasing supply availability to BVWSD during dry years. The District will manage said supplies with in-District entities, out-of-District entities, or a combination of these.

COMPONENT 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The northern portion of the Buttonwillow Service Area, generally northerly of Lerdo Highway, is often referred to as the "Northern Area Lands". Some portion of said lands are encumbered (or will be encumbered) by federal conservation easements, and overlie aquifers with elevated levels of total dissolved solids (TDS) of approximately 1,000 to 3,000 milligrams per liter [mg/L] and have poor drainage characteristics.

The federal conservation easements typically require that 40% of the surface water that would be typically available to the land in any one year, still be made available to such land. The remaining 60% of the water can be used on other land; however, present District allocation policies allow this water to be used only on other land within the District.

BVWSD's CEWAMP consists of acquiring and actively managing some or all of the water supplies in the Northern Area Lands that have already entered into, or that will enter into, federal conservation easement programs and that have transitioned away from full agricultural production. The District anticipates that

approximately 5,000 acres of land have been or will be encumbered by said easement programs, and as a result, irrigation demands on these lands have been significantly reduced, resulting in an estimated potential net water availability of approximately 2,000 to 5,000 AF/Yr. The District will manage resultant water supplies through in-District programs, out-of-District programs, or a combination of these.

The CEWAMP may be implemented by one or more of the following:

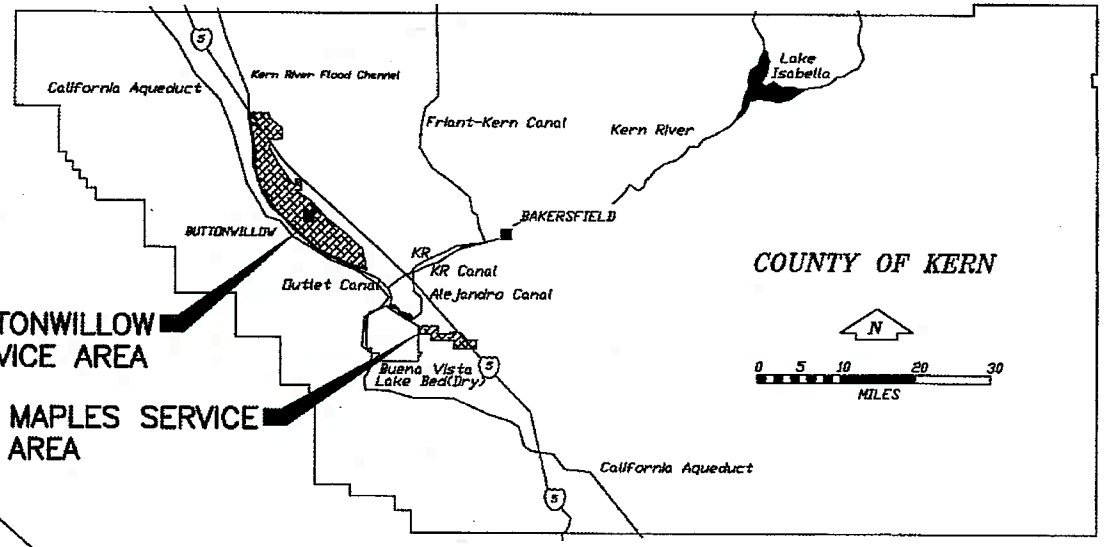
- Leasing agricultural land that would then be allowed to lie fallow, allowing the water that would have been used to irrigate said land to be used elsewhere
- Acquiring the water service rights from owners within the Northern Areas Lands, such as buying back water use allocations from current users
- In-District remarketing, including marketing water obtained through the above methods for use or sale within the District
- Other methods as yet to be defined (to be described in the draft EIR)

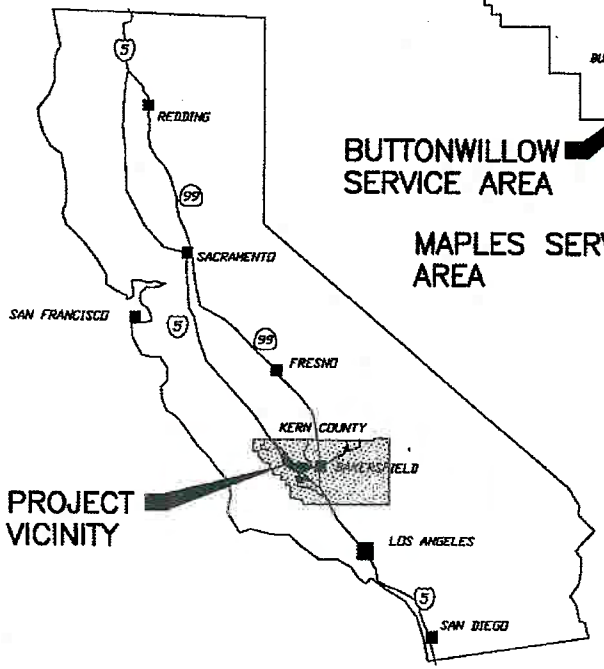
COMPONENT 4: Brackish Ground Water Remediation Project (BGRP)

A shallow brackish ground water table exists generally throughout northern portions of the Buttonwillow Service Area, often standing at depths of less than 40 feet. This brackish water often negatively impacts crop yield and prohibits the selection of higher-value, less salt-tolerant crops in the affected areas. The purpose of the BGRP is to improve these lands for agricultural use by physically lowering the brackish water table by aquifer dewatering. An additional benefit of this is the possible improvement in ground water quality in those areas.

The District's BGRP is designed to recover brackish ground water from strategic locations within the ground water basin, and consists of constructing and operating shallow- and medium-depth recovery wells and collection and conveyance pipelines that will recover and transport brackish ground water to receiving facilities located either inside or outside District boundaries. Potential environmental impacts associated with the construction and operation of the receiving facilities will be addressed by the entity receiving such brackish water.

Extraction of ground water may also be through landowner wells, tile drainage systems through individual volunteer landowner agreements, or other methods designed to remove brackish water that may be developed during the EIR process. Annual recovery anticipated by the BGRP is estimated to be approximately 12,000 AF/Yr. The District will manage the resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.





LEGEND

BUENA VISTA WATER STORAGE DISTRICT

NOTE:
MAP PROVIDED BY BUENA VISTA WATER STORAGE DISTRICT.

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

KDIEGO STEWART INCORPORATED
3502 University Ave. • Riverside, CA 92501 • 951-684-5900

BUENA VISTA WATER STORAGE DISTRICT

WATER MANAGEMENT PROGRAM

PROGRAM VICINITY

SCALE: N.T.S. DATE: 11/03/08 DRAWN BY: JGS CHECKED BY: VEM W.O.: 578-8

EXHIBIT B

578-8f1.dwg

Belridge Water Storage District Attn Greg Hammet P O Box 250 Lost Hills CA 93249-0250 21900 Hwy 33 McKittrick CA 93251 661-762-7316	City of Bakersfield Water Resources Dept. Attn Florn Core 1000 Buena Vista Rd Bakersfield CA 93311 661-326-3715
Berrenda Mesa Water District Attn Harry O Starkey PE 2100 "F" St Ste 100 Bakersfield CA 93301 661-325-1284	California Department of Water Resources State Water Project Analysis Office Attn Lincoln King 1416 Ninth St Sacramento CA 95814 916-653-6955
Henry Miller Water District Attn Joe Lutje P O Box 9759 Bakersfield CA 93389	US Fish & Wildlife Service 2800 Cottage Wy Rm W-2605 Sacramento CA 95825
Kern County Water Agency Attn Jim Beck P O Box 58 Bakersfield CA 93302-0058 3200 Rio Mirada Dr Bakersfield CA 93308 661-634-1400	California Department of Fish & Game Central Region Headquarters Office Attn Bill Loudermilk Regional Manager 1234 E Shaw Ave Fresno CA 93710 559-243-4005 x 151
Kern Delta Water District Attn: Mark Mulkay 501 Taft Hwy Bakersfield CA 93307 661-834-4656	Beale Memorial Library Attn Andrea Apple Head Librarian 701 Truxtun Ave Bakersfield CA 93301 661-868-0701
Kern Water Bank Authority Attn Jonathan Parker General Manager 5500 Ming Ave Ste 490 Bakersfield CA 93309 661-398-4900	Lost Hills Water District Attn Phillip D Nixon Secretary/Manager 3008 Sillect Ave Ste 205 Bakersfield CA 93308 661-663-9022
North Kern Water Storage District Attn Dick Diamond P O Box 81435 Bakersfield CA 93380-1435 33380 Cawelo Ave Bakersfield CA 93308 661-393-2696	West Kern Water District Attn Jerry W Pearson General Manager P O Box 1105 800 Kern St Taft CA 93268-1105 661-763-3151

Rosedale-Rio Bravo Water Storage District Attn Eric Averett 849 Allen Road Bakersfield CA 93314-9402 661-589-6045	Wheeler Ridge-Maricopa Water Storage District Attn Bill Taube 12109 Maricopa Hwy Bakersfield CA 93313-9360 661-858-2281
Semitropic Water Storage District Attn Wilmar L Boschman 1101 Central Ave P O Box Z Wasco CA 93280-0877 661-758-5113	County of Kern, Planning Department Attn Ted James Public Services Building 2700 "M" Street., Suite 100 Bakersfield, CA 93301-2370 (661) 862-8601
Kings County Community Development Department Attn Greg Gatzka Deputy Director 1400 W Lacey Boulevard Hanford CA 93230	Tulare County Countywide Planning Division Attn David Clayton Chief Planner 5961 S Mooney Boulevard Visalia CA 93277
Inyo County Planning Department Attn Pat Cecil Planning Director P.O. Box L Independence CA 93526	San Bernardino County Community Development Division 290 North "D" Street, 6th Floor San Bernardino CA 92415-0040
Los Angeles County Department of Regional Planning 320 West Temple Street Los Angeles CA 90012	Ventura County Planning Division Attn Kim Rodriguez Division Manager 800 S Victoria Avenue Ventura CA 93009
Monterey County Resource Management Agency – Planning Department Attn Mike Novo Planning Director 168 W Alisal Street, 2nd Floor Salinas CA 93901	Santa Barbara County Planning and Development Attn John Baker Director 123 East Anapamu Street Santa Barbara CA 93101-2058
San Luis Obispo County Department of Planning and Building Attn Victor Holanda County Government Center San Luis Obispo CA 93408	

Note: The San Luis Obispo County Government Center has its own separate zip code.

Mr. Russ Fuller
Antelope Valley – East Kern Water Agency
5500 West Avenue N
Palmdale, CA 93551

Ms. Mary Lou Cotton
Castaic Lake Water Agency
27234 Boquet Canyon Road
Santa Clarita, CA 91350-2173

Mr. Brian Haas
Water Agency Inc.
2291 W. Barstow Ave.
Fresno, CA 93711

Mr. Thomas Mulvihill
Indian Wells Valley Water Distirict
PO Box 1329
Ridgecrest, CA 93556-1329

Mr. David Ansolabehere
Cawelo Water District
17207 Industrial Farm Road
Bakersfield, CA 93308

Mr. Tim Ruiz
East Niles Community Services District
PO Box 6038
Bakersfield, CA 93386

Mr. Jerry Pearson
West Kern Water District
PO Box 1105
Taft, CA 93268-1105

Mr. Dave Beard
Kern County Water Agency
Improvement District 4
PO Box 58
Bakersfield, CA 93302-0058

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APPENDIX F

BVWSD INITIAL STUDY FOR THE BUENA VISTA WATER MANAGEMENT PROGRAM, JUNE 2009

BUENA VISTA WATER STORAGE DISTRICT
POST OFFICE BOX 756
525 NORTH MAIN STREET
BUTTONWILLOW, CA 93206
(661) 324-1101

BUENA VISTA WATER STORAGE DISTRICT
INITIAL STUDY
FOR THE
BUENA VISTA WATER MANAGEMENT PROGRAM

JUNE 2009

Prepared by

KRIEGER & STEWART, INCORPORATED
ENGINEERING CONSULTANTS
3602 UNIVERSITY AVENUE
RIVERSIDE, CALIFORNIA 92501
(951) 684-6900

SIGNATURE _____

DATE 9/29/09

REGISTERED PROFESSIONAL ENGINEER
DAVID A. [illegible]
No. 42922
Exp. 03/31/10
CIVIL
STATE OF CALIFORNIA

578-8.2
(REPORTS/CEQA/578-8-IS FINAL)
VEM/DFS/jcb

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APPENDICES

A. BVWSD WATER BALANCE FOR YEARS 1970-2007 AND BVWSD FORECASTED GROUNDWATER BALANCE FOR YEARS 2000-2080
B. MEMORANDUM OF UNDERSTANDING REGARDING OPERATION AND MONITORING OF THE BUENA VISTA WATER STORAGE DISTRICT GROUNDWATER BANKING PROGRAM
C. BUENA VISTA WATER STORAGE DISTRICT GROUNDWATER MONITORING PLAN

PART 1
PROJECT INFORMATION

PART 1 - PROJECT INFORMATION

A. INTRODUCTION

1. Buena Vista Water Storage District

Buena Vista Water Storage District (BVWSD or the District) was organized in July 1924 to manage the irrigation and drainage systems and water rights originally held by Henry Miller and Charles Lux of the Miller and Lux Land Company. The mission of BVWSD is to provide the landowners and water users of the District with a reliable, affordable, and usable water supply, while facilitating programs that protect and benefit the groundwater basin and better utilize water supply resources.

BVWSD lies in the trough of California's southern San Joaquin Valley, approximately sixteen miles westerly of the City of Bakersfield. The District's service area comprises approximately 50,000 acres within the lower Kern River watershed, and is physically divided into two distinct areas, as follows: the Buttonwillow Service Area and the Maples Service Area (collectively, "Service Area"; see Figure 1). The Buttonwillow Service Area comprises approximately 45,000 acres situated northwesterly of the Buena Vista Lake Bed (which consists of agricultural land that is served by Henry Miller Water District [HMWD]). HMWD is a part of BVWSD; however, HMWD is not a part of BVWSD's Service Area. The Maples Service Area comprises approximately 5,000 acres situated easterly of the Buena Vista Lake Bed. Of the District's Service Area, approximately 45,000 acres have been developed, and approximately 35,000 acres are farmed annually to primarily field and row crops.

2. Existing Water Supply and Use

The District controls an average entitlement of approximately 158,000 acre-feet per year (AF/yr) of surface water from the Kern River, based on the Miller-Haggin Agreement of July 28, 1888. In 1973, BVWSD contracted with Kern County Water Agency (KCWA) for an additional surface water supply. Said contract provides an annual firm entitlement of 21,300 acre-feet (AF) and a surplus entitlement of 3,750 AF of State Water Project (SWP) water via KCWA, who serves as the local contracting agency for the SWP. The

KCWA has long-term contracts for providing SWP water with thirteen local water districts (termed "member units"), including BVWSD.

The SWP is operated and maintained by the California Department of Water Resources (DWR) and provides water supplies for approximately 23 million Californians and approximately 755,000 acres of irrigated farmland. SWP facilities consist of a water and power development and conveyance system that includes pumping and power plants; reservoirs, lakes, and storage tanks; and canals, tunnels, and pipelines (including the California Aqueduct) that capture, store, and convey water to 29 SWP contractors throughout California, including KCWA.

BVWSD currently has access to SWP water from five turnouts along the California Aqueduct, providing approximately 850 cubic feet per second (cfs) of added gravity inflow capacity directly into the District's distribution system. The District's geographic location relative to the California Aqueduct and to other KCWA member units provides opportunities for exchanging BVWSD's Kern River water for other member units' SWP water (see Figure 2).

The District utilizes surface water transport (canals) to fulfill approximately three-quarters of irrigation demands within its Service Area. The District fulfills the remaining irrigation demands via replenishment of the groundwater, which is subsequently pumped by the District and local landowners. The District has also been a historic user of surplus Friant-Kern Canal flows to serve irrigation demands and for groundwater recharge programs.

Groundwater replenishment is effected by the District's intentional recharge efforts and by seepage from District canals. Total groundwater replenishment, including canal losses, currently exceeds total District groundwater extraction by an annual average of approximately 46,000 AF/year (refer to Appendix A).

The Kern County Subbasin (California's Groundwater, Bulletin 118) comprises the entire southern end of the San Joaquin Valley Groundwater Basin, and has been further divided into additional hydrological subbasins based on E-log analysis and seismic mapping of undulating bedrock structures formed due to folding or faulting (KCWA, 1991). Several of these subbasins exhibit partial or substantial isolation from adjoining parts of the larger

basin along some boundaries. The District's Buttonwillow Service Area is located in the so-called Buttonwillow (hydrologic) Subbasin, which exhibits some isolation from the larger main basin to the east and exhibits groundwater behavior which is consistent with the interpreted shape and structural controls of the Buttonwillow Subbasin.

The Kern County Subbasin has been classified by DWR as a critically overdrafted groundwater basin; however, in consideration of the quantities of groundwater replenishment described above, the District has historically been able to achieve a positive groundwater balance, as shown in the Buena Vista WSD Water Balance (see Appendix A) for years 1970 through 2007, and anticipates the same for at least the next seventy years, as shown in BVWSD Forecasted Groundwater Balance (see Appendix A). The Buena Vista WSD Water Balance and the BVWSD Forecasted Groundwater Balance, prepared by BVWSD, were calculated using a method developed as part of a countywide "Groundwater Mediation" process that was facilitated by KCWA.

The District has also participated in groundwater banking programs, acquired and managed other supplemental surface supplies, and developed irrigation tailwater recovery programs to ensure its long-term positive balance within the groundwater basin. Additionally, the District monitors both shallow and deep groundwater characteristics in an effort to better understand and manage this important groundwater resource. Additional details pertaining to the District's monitoring efforts are included in the Buena Vista Water Storage District Groundwater Monitoring Plan which was prepared by BVSWD (see Appendix C). The Program, as set forth herein, will not conflict with the aforementioned groundwater banking or monitoring programs. Said groundwater banking programs are outlined in the District's Groundwater Status and Management Plan (GSMP, 2002). A copy of the GSMP is available for review at the District office.

Because of the District's appropriative rights on the Kern River, the District has access to large quantities of high-flow water supplies in wet years. The District has long realized the value of aquifer storage and recovery programs with third parties and has developed and participated in such programs in order to maximize the usage of surplus wet-year water supplies. In 1983, BVWSD entered into a joint banking and recovery program with its southwesterly neighbor, West Kern Water District. In 2002, the District entered into a similar program with one of its easterly neighbors, Rosedale-Rio Bravo Water

Storage District. In addition to these two programs, the District has operated various small District storage and recovery programs.

B. PROGRAM DESCRIPTION

1. Proposed Program

The primary water management objective of the Buena Vista Water Storage District is to benefit the lands, landowners, and water users within its boundaries through a more economic and efficient distribution and use of available water supplies. In 2007, court decisions greatly impacted the ability of the State Water Project and Central Valley Project to conduct Delta pumping operations for their contract holders, which, combined with drought conditions, has thrust California into a water supply crisis.

In an effort to better maximize the benefits of District assets and creatively assist other water users, the District is considering the implementation of the Buena Vista Water Management Program (Program) which consists of four components designed to more effectively and beneficially manage the District's water resources and facilities. Said components are listed and described below. BVWSD's Water Management Program consists of implementing some or all of the following components.

COMPONENT 1:	Groundwater Recharge and Recovery Project (GRRP)
COMPONENT 2:	Water Exchange Project (WEP)
COMPONENT 3:	Conservation Easement Water Acquisition and Management Project (CEWAMP)
COMPONENT 4:	Brackish Groundwater Remediation Project (BGRP)

a. <u>COMPONENT 1: Groundwater Recharge and Recovery Project (GRRP)</u>

BVWSD has historically stored water in the underlying groundwater basin. In addition to the District's existing groundwater banking programs, the GRRP will store water within, and recover the additional stored groundwater from, the groundwater basin.

The GRRP consists of groundwater recharge that will be conducted through direct recharge methods, in-lieu methods, or a combination of these. The District has conducted and will continue to conduct direct recharge by delivering surface water to the groundwater basin via canal seepage, recharge ponds, and irrigation deep percolation. Total District groundwater replenishment currently exceeds total District groundwater extraction by an annual average of approximately 46,000 acre-feet per year (AF/yr) as show in Appendix A.

BVWSD currently has seven District-owned recovery wells within the Buttonwillow Service Area. According to a 2005 survey, there are approximately 200 landowner wells within District boundaries. The GRRP includes the addition of up to seventeen District-owned recovery wells over the life of the GRRP in order to provide adequate recovery capacity and necessary operational flexibility.

The GRRP groundwater recovery may include the use of District wells, the indirect use of landowner wells throughout the District via reductions in surface water supply allocations, via the use of individual volunteer landowner wells pursuant to agreements with the District, via the use of other wells within the District's service area, or a combination of these. The GRRP's ultimate additional annual recovery above existing conjunctive-use and project demand is could be up to 20,000 AF/yr, and the District will manage resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.

b. <u>COMPONENT 2: Water Exchange Project (WEP)</u>

BVWSD's Water Exchange Project (WEP) will allow the District to deliver portions of its water supplies to other entities in exchange for the later return of more regulated (less varied) water supplies. Because of the District's rights on the Kern River, the District has access to large quantities of water supplies in wet years. Historically, the District has utilized methods for using and storing its wet-year supplies for later use. One such commonly used method is the "exchange". In an exchange, the District delivers a portion of its surplus wet-

year supplies to another entity. The other entity later returns a predetermined or negotiated quantity of its regulated water to the District, with or without an additional financial consideration.

One potential participant in the WEP component is Poso Creek Water Company, who may receive water supplies for delivery into its share of the Semitropic Banking Project. Potential environmental impacts associated with the construction and operation of the Semitropic Banking Project have already been analyzed in a separate environmental analysis. Other probable participants are also likely to include regular operational exchange participants, such as Cawelo Water District, Kern Delta Water District, North Kern Water District, and Improvement District No. 4.

The WEP will ultimately allow the District to better manage its water supplies by increasing supply availability to BVWSD during dry years. The District will manage said supplies with in-District entities, out-of-District entities, or a combination of these.

c. COMPONENT 3: Conservation Easement Water Acquisition and Management Project (CEWAMP)

The northern portion of the Buttonwillow Service Area, generally northerly of Lerdo Highway, is often referred to as the "Northern Area Lands". Some portion of said lands are encumbered (or will be encumbered) by conservation easements, overlie shallow perched aquifers with elevated levels of total dissolved solids (TDS) ranging from approximately 1,000 to 5,000 milligrams per liter (mg/l); and have poor drainage characteristics.

The conservation easements typically require that 40% of the surface water that would be typically available to the land in any one year, still be made available to such land. The remaining 60% of the water can be used on other land; however, present District allocation policies allow this water to be used only on other land within the District.

BVWSD's CEWAMP consists of acquiring and actively managing some or all of the water service rights for the Northern Area Lands that have already entered into, or that will enter into, conservation easement programs and that have transitioned away from full agricultural production.

The District anticipates that approximately 5,000 acres of land have been or will be encumbered by said easement programs, and as a result, irrigation demands on these lands have been significantly reduced, resulting in an estimated potential net water availability of approximately 5,000 AF/yr. The District will manage resultant water supplies through in-District entities, out-of-District entities, or a combination of these.

Implementation of the CEWAMP include one or more of the following:

- Leasing agricultural land that would then be allowed to lie fallow, allowing the water that would have been used to irrigate said land to be used elsewhere;

- Acquiring the water service rights from owners within the Northern Area Lands, such as buying back water use allocations from current users;

- In-District remarketing, including marketing water obtained through the above methods for use or sale within the District;

- Other methods as yet to be defined (to be described in the draft EIR).

d. <u>COMPONENT 4: Brackish Groundwater Remediation Project (BGRP)</u>

A shallow brackish groundwater table exists generally throughout northern portions of the Buttonwillow Service Area, often standing at depths of less than 40 feet. This brackish water often negatively impacts crop yield and prohibits the selection of higher-value, less salt-tolerant crops in the affected areas. The purpose of the BGRP is to improve these lands for agricultural use by physically

lowering the brackish water table by aquifer dewatering. An additional benefit of this is the possible improvement in groundwater quality in those areas.

The District's BGRP is designed to recover brackish groundwater from strategic locations within the groundwater basin, and consists of constructing and operating shallow- and medium-depth recovery wells and collection and conveyance pipelines that will recover and transport brackish groundwater to receiving facilities located either inside or outside District boundaries. Potential environmental impacts associated with the construction and operation of the receiving facilities will be addressed by the entity receiving such brackish water. One potential participant in the BGRP component is Hydrogen Energy International LLC, who may receive brackish groundwater at a future power plant that is currently in the planning stages for Section 10, Township 30 South, Range 24 East, in the southerly portion of the Buttonwillow Service Area.

Extraction of groundwater may also be through landowner wells, tile drainage systems through individual volunteer landowner agreements, or other methods designed to remove brackish water that may be developed during the environmental review and planning process. Annual recovery anticipated by the BGRP is estimated to be approximately 12,000 AF/yr. The District will manage the resultant supplies through programs with in-District entities, out-of-District entities, or a combination of these.

2. Purpose

The District's primary water management objective is to benefit the lands, landowners, and water users within its boundaries through the most economic and efficient distribution and use of available water supplies. The intent of the Program is to improve the efficiency of water management within the District by implementing the following:

- Infiltration and storage in the groundwater aquifer of available surplus water supplies, which may be later recovered as needed via either District or landowner wells;

- Exchanges with other entities to better accommodate the District's dry-year demands;

- Conservation by acquiring and managing water service rights on land that has been encumbered by wildlife easements; and

- Increasing available water supplies and improving certain areas of the Buttonwillow Service Area for agricultural use by extracting and transporting brackish shallow groundwater from said areas.

The Program will benefit the lands, landowners, and water users within the District's boundaries by increasing the efficiency of use and distribution of available water supplies, which will be used to further improve services within the District.

The Program is proposed in order to provide effective and beneficial management of the District's water supply through exchanges, water conservation, groundwater recharge and recovery, and other means described herein. Through implementation of the Program, the District desires to ensure a continuously reliable, affordable, and usable water supply for District customers, and to facilitate programs that protect and benefit the groundwater basin.

C. ENVIRONMENTAL SETTING

1. Location

As shown in Figure 1, the District lies in the trough of California's southern San Joaquin Valley, and is located within a portion of the lower Kern River watershed where historic runoff created the heavy clay soils from former swamp and overflow lands north of Buena Vista Lake. The BVWSD Service Area comprises approximately 53,400 acres on the western side of the valley floor, approximately sixteen miles westerly of the City of Bakersfield. The area includes the former Buena Vista Lake Bed, now farmed by private landowners, and that portion of the swamp and overflow lands between the town-sites of Tupman and Lost Hills. The unincorporated town-site of Buttonwillow (population 1,500), being the hub of local farm activity, is situated in the geographical center of the Program area. The District's Service Area (see Figures 1 and 2), which excludes the Buena Vista Lake Bed (served by the Henry Miller Water District), contains approximately 45,000 acres

of agricultural land, of which approximately 35,000 acres are farmed annually to primarily field and row crops. The District's Service Area is physically divided into two distinct locations. The major portion, situated northwesterly of the Buena Vista Lake Bed, is known as the Buttonwillow Service Area and comprises approximately 45,000 acres. The much smaller area, east of Buena Vista Lake, is known as the Maples Service Area and comprises approximately 5,000 acres.

As described herein, the Program components will be initiated in various locations within the District's boundaries; however, the Program is intended to be in effect throughout, and to benefit, the District's entire Service Area.

2. Climate

The climate of the Program area is typical of the southern San Joaquin Valley, with temperatures ranging from an average maximum of 98 degrees Fahrenheit (°F) during summer months to an average minimum of 34 °F during winter months. Precipitation averages approximately 5.6 inches per year, with a majority of rainfall occurring during January through March. Climate data was obtained from the Western Regional Climate Center website, data for the Buttonwillow, California station during the period January 1, 1940 through December 31, 2008.

3. Geology

The following has been excerpted from Crewdson, Robert A., in prep 2009, A Preliminary Evaluation of the Geology, Hydrology, and Groundwater Geochemistry of the Buena Vista Water Storage District, Sierra Scientific Services, Bakersfield, CA:

The southern San Joaquin Valley is an asymmetric geological basin, which has most recently been filled with Late Pleistocene (since 650,000 years before present) alluvial sediments eroded from the marine sedimentary rocks of the Temblor Range on the west and the granitic rocks of the Sierra Nevada Mountains on the east. The sediments transported from the Temblor Range tend to be unconsolidated clayey silts, whereas the sediments transported from the Sierras tend to be unconsolidated sands and silty sands. These sediments are vertically interbedded where the distal edges of opposing alluvial fans were alternately deposited one on top of the other through geologic time. This zone of overlap

constitutes the geological axis of the upper basin and lies much closer to the western edge of the basin because of the relative dominance of the higher rates and volumes of erosion and deposition from sources to the east. The topographic axis of the basin, evidenced by the location of the original, natural course of the Kern River, lies much closer to the western edge of the basin for the same reason.

The Late Pleistocene epoch in California and the western United States was a geologic period of glacial and interglacial activity. In some parts of the San Joaquin Valley, laterally extensive clay layers, such as the Corcoran Clay layer, are interbedded with the alluvial sediments. These clay layers are interpreted to be the deposition of glacial fines in quiet lacustrine environments; however, no such clay deposits have been recognized under the District. The very latest sediments to be deposited in the area are the organic-rich silts and clays (of the Lokern series), which are the result of low-velocity, seasonal sedimentation due to outflow from the Buena Vista Lakebed.

The long, narrow Buttonwillow Service Area of the District straddles the old Kern River course and overlies the geological axis of the basin. The geologic strata down to a depth of at least 600-700 feet beneath the District consist of these interbedded alluvial deposits. Unlike other parts of the basin, there is no laterally expansive clay layer comparable to the Corcoran Clay, which serves to separate the saturated zone into unconfined and confined aquifers in those areas. However, the water table is very shallow in the northern portion of the District, and this may, in part, be attributed to slow percolation through locally shallow strata with lower permeability.

4. Land Use

The District's Service Area is primarily agricultural. Cotton is the dominant crop; however, cropping patterns have been shifting, due to poor market conditions for cotton. The main shift has been from cotton to more alfalfa, grains, pistachios, and fallow. The cropping pattern within the District's Service Area in 2008 was as follows:

Crop	Acreage	Percent of Total District Cropping Pattern
Cotton	13,400 acres	38%
Alfalfa	10,100 acres	28%
Grains	5,300 acres	15%
Pistachios	3,400 acres	10%
Miscellaneous Field Crops	3,200 acres	9%

Total crop water consumptive use peaked in the mid-1970s, averaging approximately 113,000 AF/yr. Total crop consumptive use has since declined, and averaged approximately 99,500 AF/yr during the period 2000-2007. Total known crop consumptive use for the Buttonwillow Service Area in 2003 is shown in Figure 3.

5. Groundwater

The landowners within the District have long realized the importance of their groundwater supply. District staff, as directed by the Board of Directors, began monitoring the groundwater as early as the 1940s. Today, the District not only maintains detailed surface water delivery records, but comprehensive groundwater monitoring records as well. Both of these programs have progressed with new technologies as new concerns for the basin's protection materialize.

Figures 4 and 5 show, respectively, District-wide depths to groundwater and shallow groundwater in 2008. As shown in Figure 4, there is a ridge of groundwater at a depth of approximately 20 feet in the vicinity of Lerdo Highway. Groundwater depths increase to the north and to the southeast, indicating that groundwater flows in those directions. The northern outflow is caused by the large water level depression to the east near the Buttonwillow Ridge and the southern outflow migrates towards the heavily pumped areas within and to the north of the Kern Fan.

The northern portion of the Buttonwillow Service Area overlies aquifers characterized by levels of total dissolved solids (TDS) that exceed the California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 1,000 mg/L. TDS levels in said northern portion range from 1,000 to 3,000 mg/L), while the southern portion of the

Buttonwillow Service Area has lower TDS levels (TDS levels of 300 to 500 mg/L), as shown in Figure 6. Shallow groundwater TDS levels typically range from 1,000 mg/L to 5,000 mg/L and are shown in Figure 7.

Elevated TDS levels in the northern area have resulted in minimal pumping north of Lerdo Highway. Surface water delivery shortages in this area are mitigated by the District's tailwater reclamation program. Since the southern area enjoys fairly low levels of TDS, it relies on groundwater pumping to make up surface water delivery shortages. These two factors, along with ground surface elevations (see Figure 8), groundwater elevations (see Figure 9), and heavy pumping adjacent to the District, contribute to the southeasterly groundwater flow indicated in Figure 4.

Between 2003 and 2008, depth to groundwater levels increased by approximately 10 to 30 feet[1] throughout the District (see Figure 4). Immediately south of the Buttonwillow Service Area, the District has historically recharged wet year supplies in cooperation with the Tule Elk Reserve State Park. The historic sloughs in the Park are very pervious and are thus able to receive large, long-term recharge flows within relatively small recharge areas. This activity reduces the groundwater gradient to the south, and helps maintain low TDS levels in this area.

According to the District's groundwater monitoring records, much of the northern part of the District (generally north of Dargatz Road) suffers from an extremely shallow perched water table that encroaches into the root zone of the crops (see Figure 5). The spring groundwater levels range from approximately two to ten feet below ground surface for much of the northern portion of the District's Buttonwillow Service Area. Known crop yields throughout the area are said to be affected, but no quantitative studies have been undertaken. Approximately 12,000 to 15,000 acres are affected by shallow groundwater conditions within the District.

As shown in Figure 7, both the western and northeastern areas have high salinity levels (2,000 to 5,000 mg/L TDS). From 1996 to 2005, there have been significant decreases in levels of TDS (reductions of up to 900 mg/L TDS) in the southeastern portion of the

[1] See Figure 3 "Depth to Groundwater Map, December 2003" included in the document Buena Vista Water Storage District Initial Study and Mitigated Negative Declaration for the 2006 Groundwater Transfer Program (October 2006, a copy of which is available for review at the District's office).

Buttonwillow Service Area. The District, for the most part, saw no significant degradation over the period, possibly due to the application of high quality surface irrigation water.

D. LEAD AGENCY

The District is lead agency under the California Environmental Quality Act (CEQA) for the Program, as it is the public agency with the primary responsibility for preparing CEQA documents and for approving, funding, and carrying out the Program.

E. AUTHORITY

BVWSD is organized in accordance with California Water Storage District Law (Division 14, commencing with Section 39000, of the California Water Code) with the powers and authorities as set forth in said code, including the powers of acquiring, improving, and operating works for the storage and distribution of water. BVWSD is empowered to plan, construct, operate, maintain, repair, and replace water system facilities as needed to provide water service in compliance with applicable standards and regulations. In addition, the District is specifically authorized to "...sell, distribute, or otherwise dispose of water and water rights not necessary for the uses and purposes of the district" (Water Code Section 43001).

F. COMPLIANCE WITH CEQA

This is a public information document. Information contained herein is intended to explain the environmental impacts expected to result from implementation of the Program, and to satisfy the disclosure requirements of the CEQA and the State CEQA Guidelines.

PART 2
ENVIRONMENTAL EFFECTS AND CHECKLIST

PART 2 - ENVIRONMENTAL EFFECTS AND CHECKLIST

A. PROGRAM INFORMATION

1. Project Title:

Buena Vista Water Management Program

2. Lead Agency Name and Address:

Buena Vista Water Storage District
P. O. Box 756
525 North Main Street
Buttonwillow, CA 93206

3. Contact Person and Phone Number:

Dan W. Bartel, Engineer-Manager
(661) 324-1101

4. Project Location:

Areas within Buena Vista Water Storage District Boundaries
Vicinity of Buttonwillow, Southern San Joaquin Valley, California
See Figures 1 and 2

5. Project Sponsor's Name and Address:

Buena Vista Water Storage District
P. O. Box 756
525 North Main Street
Buttonwillow, CA 93206

6. General Plan Designation: Agricultural

7. Zoning: Agricultural

8. Description of Project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheet(s) if necessary.)

See pages 4-8.

9. Surrounding Land Uses and Setting: (Briefly describe the project's surroundings.)

See pages 9-11.

10. **Other public agencies whose approval may be required** (e.g., permits, financing approval, or participation agreement):

- Kern County Water Agency
- California Department of Water Resources
- State Water Resources Control Board

B. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- ❑ Aesthetics
- ❑ Air Quality
- ❑ Cultural Resources
- ❑ Hazards & Hazardous Materials
- ❑ Land Use/Planning
- ❑ Noise
- ❑ Public Services
- ❑ Transportation/Traffic
- ❑ Mandatory Findings of Significance
- ❑ Agriculture Resources
- ❑ Biological Resources
- ❑ Geology/Soils
- ❑ Hydrology/Water Quality
- ❑ Mineral Resources
- ❑ Population/Housing
- ❑ Recreation
- ❑ Utilities/Service Systems

C. **DETERMINATION** (To be completed by the Lead Agency):

On the basis of this initial evaluation:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

- ☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

- ☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

- ☐ I find that the proposed project MAY have a "potentially significant" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

- ☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

- ☒ I find that the proposed project COULD NOT have a significant effect on the environment with proposed mitigation in place; however, due to public controversy, and out of an abundance of caution, an ENVIRONMENTAL IMPACT REPORT will be prepared.

9/29/09

David F. Scriven
KRIEGER & STEWART, INCORPORATED
District Consulting Engineer
BUENA VISTA WATER STORAGE DISTRICT

Date

D. EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g. the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a. Earlier Analyses Used. Identify and state where they are available for review.

b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

c. Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g. general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7. Supporting Information Sources. A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9. The explanation of each issue should identify:

a. The significance criteria or threshold, if any, used to evaluate each question; and

b. The mitigation measure identified, if any, to reduce the impact to less than significance.

E. ENVIRONMENTAL CHECKLIST

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	❑	❑	☒	❑

The GRRP component of the Program includes construction and operation of up to seventeen groundwater recovery wells over the life of the Program. The BGRP component of the Program includes construction and operation of several shallow- and medium-depth recovery wells and their associated transmission and conveyance pipelines. Said facilities will be constructed within existing agricultural or other previously disturbed land within the Buttonwillow Service Area. Aboveground portions of facilities will be relatively small and unobtrusive. Therefore, the Program does not have the potential to degrade the existing visual character or quality of the Program area or its surroundings. Any visual impacts resulting from the aboveground portions of the wells will be less than significant. For the reasons stated above, the Program does not have the potential to adversely impact a scenic vista.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	❑	❑	❑	☒

There are no officially designated state scenic highways located in Kern County. There are several eligible scenic highways located in the eastern portion of Kern County; however, the nearest one, State Highway 14, is greater than 50 miles easterly of the City of Bakersfield. Further, the facilities described in I.a. will be constructed on existing agricultural land or other previously disturbed land; therefore, the Program does not have the potential to substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	❑	❑	☒	❑

The Program includes construction of belowground collection and conveyance facilities and several shallow- and medium-depth recovery wells associated with the BGRP component of the Program. The Program also includes construction of up to seventeen groundwater recovery wells associated with the GRRP. Said facilities will be constructed within existing agricultural or other previously disturbed land within the Buttonwillow Service Area. Any visual impacts resulting from the aboveground portions of the recovery wells will be less than significant. Therefore, the Program does not have the potential to substantially degrade the existing visual character or quality of the Program area or its surroundings.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	❑	❑	❑	☒

The Program does not include any features that would create new sources of light or glare.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	❑	❑	❑	☒

The Program does not include conversion of Farmland to non-agricultural use. Some of the facilities constructed pursuant to the GRRP and BGRP will be constructed on existing or former agricultural lands. The aboveground portions of Program facilities will have a very small permanent footprint, and are not large enough to convert substantial areas of Farmland to non-agricultural use.

It should be noted that the CEWAMP component of the Program will not convert Farmland to non-agricultural use, but will acquire and manage water service rights for Farmland that has been converted to non-agricultural use by wildlife easements.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	❑	❑	❑	☒

The Program does not have the potential to conflict with existing zoning or with a Williamson Act contract. See also II.a. above.

c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	❑	❑	❑	☒

Construction of Program facilities may cause changes in the existing environment that would result in the conversion of small areas of Farmland to non-agricultural use. These changes will be less than significant. See also II.a. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	❑	❑	☒	❑

The District's Service Area is located within the San Joaquin Valley Air Pollution Control District (SJVAPCD). Several landowners use diesel or natural gas engines to power their well pumping units. The Program (GRRP and BGRP components) may result in an increase in use of landowner wells, which may result in an incremental increase in emissions from the diesel or natural gas engines. According to the District's most recent well survey, Buena Vista Water Storage District 2005 Full Well Survey, only eleven out of the approximately 200 well pumping plants located within the District's boundaries are powered by diesel or natural gas motors; the great majority use electric motors. The District expects that the Program could potentially result in an additional zero to fifteen days of total engine runtime per year, which is equivalent to a fraction of the emissions from just one diesel truck. Therefore, any incremental increases in air pollutant emissions resulting from increased well pumping plant operation will be negligible.

There will be a temporary increase in air pollutant emissions during construction of facilities pursuant to the GRRP and BGRP components of the Program as a result of construction traffic and construction equipment and activities. Said increased emissions will be less than significant and short-term; therefore, the Program will have a negligible effect upon air quality.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	❑	❑	☒	❑

The Program will not violate any air quality standard or contribute substantially to any existing or projected air quality violation. See also III.a. above.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	❑	❑	☒	❑

The Program region is designated as nonattainment for ozone (federal and state standards), $PM_{2.5}$ (federal and state standards), and PM_{10} (state standards). The region has been designated attainment for PM_{10} under federal standards as of December 12, 2008. For all other criteria pollutants (i.e. CO, NO_X, SO_2, SO_X, and lead), the Program area is designated as attainment. The Program is anticipated to produce air pollutant emissions during construction of facilities as part of the GRRP and BGRP as well as during additional operation and maintenance trips during operation of the proposed facilities. Air pollutant emissions resulting from construction vehicles and activities will be less than significant and short-term. Dust palliatives (such as water) will be applied as often as necessary in order to prevent entrainment of fugitive dust during construction. Additional vehicle trips within the Program area for operation and maintenance of GRRP and BGRP facilities include approximately one trip per day for each site that is in operation, which will not result in significant air quality impacts. For these reasons, the Program will not result in a cumulatively considerable net increase of any criteria pollutant for which the Program region is designated nonattainment.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Expose sensitive receptors to substantial pollutant concentrations?	❑	❑	☒	❑

The District's Service Area is primarily agricultural, and construction of facilities pursuant to the GRRP and BGRP components of the Program will be constructed on existing disturbed land (such as land that is currently, or was previously, used for agriculture). Any potential air quality impacts, resulting from construction activities and equipment, to nearby residents will be minimal and short-term. Any potential air quality impacts during operation and maintenance of GRRP and BGRP facilities (approximately one trip per day to each well site) will be negligible.

e) Create objectionable odors affecting a substantial number of people?	❑	❑	❑	☒

The Program will not create objectionable odors.

IV. BIOLOGICAL RESOURCES. Would the project:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	❑	❑	☒	❑

Facilities that will be constructed as part of the GRRP and BGRP components of the Program will be located on existing or previous agricultural land or land that has been otherwise previously disturbed. Pipelines associated with Program facilities will be located belowground and will result in only temporary disturbance during construction. Wells pursuant to the GRRP will include both aboveground and belowground elements, and each well is anticipated to disturb a land area of approximately 100 feet by 100 feet. Brackish groundwater

extraction wells will include both aboveground and belowground components; however, the aboveground components are relatively small, with an estimated temporary footprint of approximately 100 feet by 100 feet for each well site, and a permanent footprint of approximately 50 feet by 50 feet for each well site. The Program will not have a substantial effect on any sensitive species or habitats thereof.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	❑	❑	☒	❑

The Program may result in lowering of groundwater levels in portions of the District. The only surface waters and riparian vegetation in the vicinity are in the Kern River Flood Channel to the west of the District, generally northerly of Lerdo Highway; the result of perched groundwater conditions. Said vegetation is periodically removed as required to maintain flood flow capacity in the channel in accordance with the requirements of the U.S. Army Corps of Engineers. Pumping associated with the BGRP component of the Program will be of shallow brackish groundwater from within the northerly portion of the Buttonwillow Service Area, and said pumping will be in compliance with any applicable wildlife easements and will not adversely impact nearby standing water, riparian vegetation, or any other natural habitat. Pumping associated with the GRRP will be recovery of previously banked groundwater, which would not result in lowering groundwater levels to the extent that riparian species or habitats, or other sensitive species or habitats, would be adversely affected.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	❑	❑	☒	❑

See IV.b. above. The Program will not have a substantial adverse effect on federally protected wetlands.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	❑	❑	☒	❑

The Program will not interfere with the movement of any native resident or migratory fish or wildlife species, with any wildlife corridors, or with the use of native wildlife nursery sites. See also IV.a. and IV.b. above.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	❑	❑	❑	☒

The Program does not conflict with any known local policies or ordinances.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	❑	❑	❑	☒

There is currently no adopted habitat conservation plan within the Program area. The Program will not conflict with the provisions of any other approved local, regional, or state habitat conservation plan.

V. CULTURAL RESOURCES. Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	❑	❑	❑	☒

All ground-disturbing activities associated with construction of GRRP and BGRP facilities will take place on previously-disturbed lands, such as lands currently or previously used for agriculture. Therefore, the Program will not impact any potential historical, archeological, or paleontological resources.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	❑	❑	❑	☒

The Program will not cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5 of the State CEQA Guidelines. See also V.a. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	❑	❑	❑	☒

The Program will not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. See also V.a. above.

d) Disturb any human remains, including those interred outside of formal cemeteries?	❑	❑	❑	☒

Program facilities will not be constructed in the vicinity of any known cemeteries or burial ground; however, if human remains are encountered during construction, the County Coroner will be notified immediately, and all work in the area will be halted or diverted until a qualified archaeologist and historian can evaluate the nature and significance of the find(s). The Program will comply with §15064.5 of the State CEQA Guidelines.

VI. GEOLOGY AND SOILS. Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	❑	❑	❑	☒

Based on the California Department of Conservation Division of Mines and Geology publication Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada (1998) and Division

of Mines and Geology Special Publication 42, BVWSD's Service Area is not located within a known fault zone. The nearest fault is the White Wolf Fault, which is located approximately six miles southeasterly of the Maples Service Area. The San Andreas Fault (Parkfield) is located greater than twenty miles westerly of the Buttonwillow Service Area. The Program does not include any activities that could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction, or landslides.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
ii) Strong seismic ground shaking?	❑	❑	❑	☒
See VI.a.i. above.				
iii) Seismic-related ground failure, including liquefaction?	❑	❑	❑	☒
See VI.a.i. above.				
iv) Landslides?	❑	❑	❑	☒
See VI.a.i. above.				
b) Result in substantial soil erosion or the loss of topsoil?	❑	❑	❑	☒

The Program does not include any activities that would have the potential to result in any soil erosion or loss of topsoil.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	❑	❑	❑	☒

The Program does not include construction of any facilities that are intended for human occupation. Facilities included in the GRRP and BGRP will not be located on a geologic unit or soil that is unstable or that would become unstable as a result of said facilities. The Program does not have the potential to result in loss, injury, or death involving onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	❑	❑	❑	☒

According to the Soil Survey of Kern County, California, Northwestern Part, issued by the United States Department of Agriculture Soil Conservation Service (September 1988), the Buttonwillow Service Area consists primarily of soils of the Buttonwillow Series and Lokern Series. These two soil series consist of deep, somewhat poorly drained, montmorillonitic soils. These soils are known to have expansive properties; however, the Program does not include construction of any facilities that are intended for human occupation and will not create substantial risks to life or property.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	❑	❑	❑	☒

The Program will not generate any sanitary wastewater, and no septic tanks or alternative wastewater systems are proposed.

VII. HAZARDS AND HAZARDOUS MATERIALS.

Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	❑	❑	❑	☒

The Program does not involve the generation of any hazardous emissions or the transport, use, or disposal of any hazardous materials.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	❑	❑	❑	☒

The Program will not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. See also VII.a. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	❑	❑	❑	☒

The Project will not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste. See also VII.a. above.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	❑	❑	❑	☒

Facilities included in the GRRP and BGRP components of the Program will not be located on a site which is included on a list of hazardous materials sites. The Program will not be impacted by hazardous materials sites.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	❑	❑	❑	☒

The nearest public airport is the Buttonwillow-Kern County Airport, which is located in Section 2, Township 30 South, Range 23 East, MDM, approximately one mile southwesterly of the Buttonwillow Service Area boundary. The Program does not include the construction of any facilities or any activities that could pose a safety hazard for people residing or working in the Program area. The Program does not have the potential to interfere with air traffic or flight patterns.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	❑	❑	❑	☒

See VII.e. above.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	❑	❑	❑	☒

The Program has no potential to affect any emergency response or evacuation plan.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	❑	❑	☒	❑

Apart from an insignificant risk of fire from construction activities and from the operation of electric motors on well pumping units, the Program has no potential to expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	❑	❑	❑	☒

The Program will comply with all applicable water quality standards, waste discharge requirements, and all requirements of the Central Valley Regional Water Quality Control Board. The BGRP component of the Program is intended to improve groundwater quality within the northern portion of the Buttonwillow Service Area by desalinating shallow brackish groundwater within the Buttonwillow Service Area by more or less continuously extracting brackish groundwater from within the Project area. Refer to Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (MOU) in Appendix B, which applies to the GRRP and BGRP components of the Program.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	❑	☒	❑	❑

The GRRP includes extraction of banked groundwater through existing and proposed new recovery wells. It is possible that the increased groundwater pumping will result in minor, short-term adverse economic impacts (lowering of groundwater levels and possible, minor degradation of water quality) to overlying groundwater users in the vicinity of Program wells. In order to prevent and/or compensate for such impacts, the District has executed a MOU with nearby water users that could potentially be impacted by the Program (see Appendix B). Additionally, an Environmental Impact Report is being prepared to further evaluate the potential impacts of the Program on other water users in the local area.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	❑	❑	❑	☒

The Program does not include any features that would result in the alteration of drainage patterns.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	❑	❑	❑	☒

The Program will not substantially alter the existing drainage pattern of the area and will not substantially increase the rate or quantities of surface runoff. See also VIII.c. above.

e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	❑	❑	❑	☒

The only aboveground features included in the Program are the wells proposed as part of the BGRP and GRRP components of the Program. Said wells have a small aboveground footprint that is not of a size sufficient to contribute substantial quantities of runoff; therefore, the Program will not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. See also VIII.c. and VIII.d. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Otherwise substantially degrade water quality?	❑	❑	☒	❑

The Program may result in minor changes to groundwater flow patterns and distribution of salinity, but said changes are not anticipated to be significant. Groundwater quality will be monitored throughout the course of the Program, and any changes in groundwater quality will be considered in evaluating future groundwater pumping activities. See also VIII.a. and VIII.b. above.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	❑	❑	❑	☒

The Program does not include construction of housing or other structures intended for human occupation.

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	❑	❑	❑	☒

Facilities proposed as part of the GRRP and BGRP include groundwater wells and associated pipelines and appurtenances. The Program does not include construction of any structures that would have the potential to impede or redirect flood flows.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	❑	❑	❑	☒

The Program does not include the construction of any structures that would have the potential to expose people or structures to loss, injury, or death as a result of flooding. The only new facilities proposed are those included in the GRRP and BGRP, which consist of groundwater recovery wells, shallow- and medium-depth groundwater extraction wells, and water transmission and conveyance pipelines and appurtenances.

j) Expose people or structures to inundation by seiche, tsunami, or mudflow?	❑	❑	❑	☒

The Program does not include construction of any facilities that are intended for human occupation. Further, the Program area is not located near any bodies of water of a size sufficient to result in seiches or tsunamis. The Program will not expose people or structures to inundation by seiche, tsunami, or mudflow.

IX. LAND USE AND PLANNING. Would the project:

a) Physically divide an established community?	❑	❑	❑	☒

The Program does not include the construction of facilities with the potential to divide an established community.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	❑	❑	❑	☒

The Program does not have the potential to alter existing land uses and does not conflict with any applicable land use plan, policy, or regulation.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	❑	❑	❑	☒

There are no conflicts between the Program and environmental plans or policies that have been adopted by agencies with jurisdiction over any aspect of the Program.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
X. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	❑	❑	❑	☒
The Program does not have the potential to impact the availability of any mineral resources or mineral resource recovery sites.				
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	❑	❑	❑	☒
See X.a. above.				
XI. NOISE. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	❑	❑	☒	❑

The only potential noise generated by the Program will be that generated during construction of Program facilities and that resulting from the operation of well pumping units and the maintenance of the wells and pipelines. Noise generated during construction activities will be less than significant and short-term. The incremental increase in noise resulting from operation of the Program will be negligible.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	❑	❑	❑	☒

The Program will not result in any groundborne vibration or groundborne noise. See also XI.a. above.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	❑	❑	☒	❑

Noise resulting from operation of the Program facilities (groundwater wells and water transmission and conveyance facilities) will be negligible. See also XI.a. above.

d) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	❑	❑	❑	☒

The nearest public airport is the Buttonwillow-Kern County Airport, which is located in Section 2, Township 30 South, Range 23 East, MDM, approximately one mile southeasterly of the Buttonwillow Service Area boundary. The Program will not expose people residing or working in the Program area to excessive noise levels. See also XI.a. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	❑	❑	❑	☒

The Program will not generate any substantial noise, and will not expose people residing or working in the area to excessive noise levels.

XII. POPULATION AND HOUSING. Would the project:

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of road or other infrastructure)?	❑	❑	❑	☒

The Program will have no direct effect on population growth. Program participants may have population impacts in the local areas of their facilities. Any population impacts from Program participants will be evaluated by said participants in separate environmental analyses.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	☒

The Program does not include any features that will require the destruction or relocation of existing housing.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	☒

The Program does not include destruction or construction of any housing, and will not increase or decrease the number of available dwelling units within the Program area. The Program will not displace substantial numbers of people.

XIII. PUBLIC SERVICES. Would the project:

a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	❑	❑	❑	☒

The Program does not include any features or facilities that will require additional or unusual fire protection resources.

Police protection?	❑	❑	❑	☒

The Program does not include any features or facilities that will be occupied or that will otherwise require enhanced levels of police protection.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Schools?	❑	❑	❑	☒

The Program is not expected to increase or decrease the Program area's population, and will therefore not result in a greater or lesser demand for schools.

Parks?	❑	❑	❑	☒

The Program is not expected to increase or decrease the Program area's population, and will therefore not result in a greater or lesser demand for parks.

Other public facilities?	❑	❑	❑	☒

The Program will have no effect upon public facilities maintenance.

XIV. RECREATION. Would the project:

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	❑	❑	❑	☒

The Program is not expected to increase or decrease the Program area's population, and will therefore not result in increased or decreased use of parks or other recreational facilities.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which have an adverse physical effect on the environment?	❑	❑	❑	☒

The Program does not include recreational facilities and will not require the construction or expansion of any recreational facilities.

XV. TRANSPORTATION / TRAFFIC. Would the project:

a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	❑	❑	❑	☒

The GRRP and BGRP components of the Program include construction of groundwater extraction wells and associated water transmission and conveyance pipelines. Said facilities will generate approximately one vehicle trip daily for each well site and pipeline location. This increase in traffic is minimal and will not cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system. The Program will not result in any significant changes in land, water, or air traffic patterns.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	❑	❑	❑	☒

The Program does not include any features which would impact traffic patterns or which would exceed any level of service standards established for designated roads or highways. See also XV.a. above.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?	❑	❑	❑	☒

The Program will have no impact upon air traffic patterns. See also XV.a. above.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	❑	❑	❑	☒

The Program will have no impact upon street design and will not substantially increase hazards due to design features or incompatible uses. See also XV.a. above.

e) Result in inadequate emergency access?	❑	❑	❑	☒

The Program will have no impact on emergency access in the Program area. See also XV.d. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Result in inadequate parking capacity?	❑	❑	❑	☒

The Program will have no impact on parking capacity in the Program area. Parking for maintenance vehicles at each well site constructed as part of the GRRP and BGRP components of the Program will be included in the site design.

g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	❑	❑	❑	☒

The Program will not conflict with any adopted policies, plans, or programs supporting alternative transportation.

XVI. UTILITIES AND SERVICE SYSTEMS. Would the project:

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	❑	❑	❑	☒

The Program will not generate wastewater.

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	☒

The water uses involved in the BGRP component of the Program are intended to operate in conjunction with desalination facilities owned and operated by others. Wells constructed pursuant to the BGRP will be placed into operation only when compatible desalination facilities are available to accept the brackish groundwater for treatment.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	☒

The Program will not require or result in the construction or expansion of any storm water drainage facilities.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	❑	❑	❑	☒

The Program involves the management of existing entitlements, and there are sufficient water supplies available to meet the requirements of the Program. The CEWAMP may also involve acquiring the water service rights from owners within the Northern Area Lands of the Buttonwillow Service Area. Said acquired service rights will be managed in accordance with the conditions of any applicable wildlife easements. No new or expanded entitlements are needed as a result of the Program.

e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	❑	❑	❑	☒

The Program will not generate sanitary wastewater.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	❑	❑	☒	❑

The Program may generate small quantities of solid waste during construction of facilities pursuant to the Program; however, said quantities of solid waste will be minimal and will be accommodated by a local landfill.

g) Comply with federal, state, and local statutes and regulations related to solid waste?	❑	❑	❑	☒

The Program will comply with all federal, state, and local statutes and regulations related to solid waste. See also XVI.f. above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or threatened species or eliminate important examples of the major periods of California history or prehistory?	❑	❑	☒	❑

The Program involves storing water in the underlying aquifer for later recovery when needed, exchanging wet-year water with other entities to better accommodate the District's dry-year demands, acquiring and managing existing water service rights from landowners whose land is encumbered by wildlife easements, and extracting shallow brackish groundwater to improve conditions for agricultural activities in the northerly portion of the Buttonwillow Service Area. The Program is not expected to have any significant effect upon biological or cultural resources. See also Sections IV and V above.

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	❑	❑	☒	❑

The Program involves storing water in the underlying aquifer for later recovery when needed, exchanging wet-year water with other entities to better accommodate the District's dry-year demands, acquiring and managing water service rights from landowners whose land is encumbered by wildlife easements, and extracting shallow brackish groundwater to improve conditions for agricultural activities in the northerly portion of the Buttonwillow Service Area. The Program will not conflict with any existing groundwater programs or activities currently operated by the District or other water suppliers. The Program will not result in any significant cumulatively considerable impacts. Potential impacts of the BGRP in conjunction with HECA's proposed facility will be addressed in the EIR.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	❑	❑	❑	☒

The Program is intended to improve the efficient use of groundwater and surface water supplies for irrigation of crops, and to increase the availability of existing water supplies for environmental and other beneficial uses. The Program does not include any components or elements that will have adverse effects upon human beings.

PART 3
REFERENCES AND SOURCES

PART 3 - REFERENCES AND SOURCES

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- Buena Vista Water Storage District Initial Study, Environmental Checklist, and Mitigated Negative Declaration for the 2002 Ground Water Transfer Program, Krieger & Stewart; March 2002

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- Kern County General Plan, Kern County Planning Department; March 13, 2007

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- Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program; effective January 1, 2003

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- Special Publication 42; Fault-Rupture Hazard Zones in California, California Department of Conservation, California Geological Survey, Interim Revision 2007

- Western Regional Climate Center Website, www.wrcc.dri.edu

FIGURES

Refer to Figures 1 through 9 of Draft EIR

APPENDIX A

BVWSD WATER BALANCE FOR YEARS 1970-2007 AND BVWSD FORECASTED GROUNDWATER BALANCE FOR YEARS 2000-2080

Refer to Appendix A of Draft EIR

APPENDIX B

MEMORANDUM OF UNDERSTANDING REGARDING OPERATION AND MONITORING OF THE BUENA VISTA WATER STORAGE DISTRICT GROUNDWATER BANKING PROGRAM

Refer to Appendix C of Draft EIR

APPENDIX C

BUENA VISTA WATER STORAGE DISTRICT
GROUNDWATER MONITORING PLAN

Refer to Appendix B of Draft EIR

APPENDIX G

REVIEW OF THE POTENTIAL ENVIRONMENTAL IMPACTS OF THE BUENA VISTA WATER STORAGE DISTRICT'S PROPOSED GROUNDWATER RECHARGE AND RECOVERY PROJECT MEMORANDUM FROM ROBERT A. CREWDSON, PH.D. TO DAN BARTEL, BUENA VISTA WATER STORAGE DISTRICT DATED SEPTEMBER 20, 2009

Robert A. Crewdson, Ph.D.

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Memo

To: Dan Bartel, Engineer Manager, Buena Vista Water Storage District

From: Robert A. Crewdson

Date: 20 September, 2009

Subject: Review of the potential environmental impacts of the Buena Vista Water Storage District's proposed Groundwater Recharge and Recovery Project.

Subject. At the request of the Buena Vista Water Storage District, I have reviewed the District's proposed Groundwater Recharge and Recovery Project (GRRP) for the purpose of evaluating the potential environmental impacts to the aquifer underlying the District. This memo contains the findings of that review and evaluation.

Background. The GRRP project description is contained in the District's draft EIR (State Clearinghouse No. 2009011008) which is currently being prepared by Krieger and Stewart, Inc. of Riverside, Ca. The District has a long history of aquifer storage and recovery (ASR) operations in which surface water is percolated into the groundwater basin and stored there for later recovery. Such operations are commonly referred to as water-banking operations or as banking projects regardless of the source of water or its intended future use. The proposed GRRP consists of groundwater recharge and/or groundwater recovery in excess of existing volumes by as much as 20,000 af/y.

We have based our evaluation on 1. the project description, 2. our understanding of the hydrogeology and groundwater geochemistry of the groundwater aquifer under the District in the general project area, and 3. the standard criteria for evaluating potential aquifer impacts of ASR projects such as this one and others in Kern County, Ca.

ASR Impact Evaluation Criteria. The three potential impacts of interest related to projects which store and recover water in groundwater aquifers are related to: 1. volumetrics, 2. water level changes, and 3. water quality changes. The baseline for all three potential impacts is whether or not the storage and recovery operations are "basin-neutral" over time.

If a potential impact is considered to be basin- neutral, then we conclude that there is no significant impact. If an impact is considered to be basin- positive, such as putting more water into the aquifer than is removed over time, then the impact (on the District water balance) is considered to be beneficial to the basin. If an impact is considered to be basin- negative, such as storing higher- TDS surface water in the aquifer while removing lower- TDS groundwater, then the impact (on the groundwater salt balance) is considered to be adverse to the basin and a level of significance must then be determined for the specific magnitude and duration of impact.

GRRP Volumetric Analysis. The GRRP project is like other banking projects which are based on the fundamental water- banking principle that the volume of water which is removed from the aquifer cannot exceed the volume of water which has previously been placed into aquifer storage. The District has demonstrated from historical District water balance data that 1. The District already has a volume of surplus water stored in the basin from prior years, and that 2. the District forecasts that it will continue to generate an average annual +47,000 af/y of excess surface water surplus to its consumptive uses which can be used in full or in part to supply the proposed GRRP. If the District "allocates" approximately 12,000 af/y of this surplus to the District's proposed Brackish Groundwater Recovery Program (BGRP) and actually extracts this volume of water, then the District will still have a long term surplus of 35,000 af/y placed into aquifer storage through existing operations which can be allocated to other projects.

The proposed GRRP is expected to recover as much as 20,000 af/y from aquifer storage. After accounting for losses, as specified by the one or more Memorandums of Understanding (MOUs) which may cover this project, the District can allocate, as necessary, up to 20,000 af/y of existing or future excess District water placed into aquifer storage to the GRRP and continually build a bank account which may be recovered under this project in the future.

As long as the District operates according to the fundamental water-banking principle, the GRRP project storage and recovery volumetrics will be basin- neutral. If the GRRP operates at full proposed capacity over time, the District water balance as a whole will continue to remain basin- positive with an expected District- wide average annual 15,000 af/y excess surface water placed into aquifer storage. In the future, if the District allocates and recovers less than 20,000 af/y to the GRRP, then the District-wide average annual volume of excess surface water placed into aquifer storage will be greater than 15,000 af/y by a like amount.

We find that the GRRP project aquifer storage and recovery volumetrics will be basin- neutral and that the long- term District water balance will remain basin- positive at every GRRP operating level up to and including full proposed extraction capacity.

GRRP Water Level Change Analysis. Based on fundamental principles, we know that adding water to an aquifer raises the water levels in the recharge area and removing water from an aquifer lowers the water levels in the recovery area. Since a project such as the GRRP which is volumetrically basin-neutral does not change the volume of water which is in the basin, the project will have no net water level impact on the basin. In other words, the project operation will cause temporary water level rises and temporary water level declines as water is recharged and recovered, but these fluctuations will average out to the same long term average water level that would have occurred in the absence of the project.

We find that as long as the GRRP recharge and recovery volumetrics are basin- neutral over the project life, then the long term water level impacts will be basin- neutral as well. If the District actually stores more water in the underlying aquifer than it removes, then the District impact of the long term net increase in aquifer volume will create a net long term rise in basin water levels which is basin- positive.

Based on the areal distribution of existing and foreseeable recharge ponds, canal seepage losses, and recharge due to over-irrigation, we conclude that an average annual recharge of 20,000 af/y allocated to the GRRP will occur over an estimated area of 20,000 acres. This volume of annual recharge will cause a maximum, temporary water level rise in the recharge area of 5 - 10 ft, based on an estimated specific yield of the shallow aquifer in the range of 0.1 - 0.2. Based on District historical water-level hydrographs, this induced water level fluctuation is less than the natural water- level variation in the basin due to natural causes. Based on fundamental principles and on actual observations, we know that mounding of the water table due to seasonal recharge will largely re-equilibrate to previous levels from one season to the next. We do not recognize any particular impact to the aquifer itself from such recharge and the temporary rise in water levels is beneficial to the operators of farm irrigation wells within the zone of impact by creating a temporary period of reduced lifting costs compared to the water levels which would exist in the absence of the recharge.

Based on the likely but as yet unspecified areal distribution of existing and foreseeable recovery wells, we conclude that an average annual recovery of 20,000 af/y allocated to the GRRP will occur over an estimated area of 6,400 acres (10 sections). This volume of annual recovery will cause a maximum, temporary water level decline in the recovery area of 15 - 30 ft, based on an estimated specific yield of the shallow aquifer in the range of 0.1 - 0.2. Based on District historical water-level hydrographs, this induced water level fluctuation is less than the natural water- level variation in the basin due to natural causes and is comparable to the temporary water- level declines by a like-number of existing farm irrigation wells. Based on fundamental principles and on actual observations, we know that depression of the water table due to seasonal recovery will largely re-equilibrate to previous levels from one season to the next. We do not recognize any particular impact to the aquifer itself from such recovery and the temporary decline in water levels is adverse to the operators of farm irrigation wells within the zone of impact only if these farm wells are actually operating during a period of project recovery. The project operation causes a temporary period of increased lifting costs compared to the water levels which would exist in the absence of the recovery.

We find that the separate impacts of project recharge and recovery have no significant impact on the aquifer.

The project recharge is expected to have a small, temporary beneficial impact on operating farm wells within the recharge area of impact and the project recovery is expected to have a moderate, temporary adverse impact on operating farm wells within the recovery area of impact. Because the expected areas of impact are different, the beneficial, temporary water level rises due to widespread recharge may not entirely offset the adverse, temporary water level declines of less-widespread recovery. The net unbalanced recharge/recovery impact at one or more operating farm wells is expected to be in the range of 10 - 20 ft of net, temporary (seasonal) water level drawdown.

We find that if this so-called adjacent-entity (net) impact is found to be significant at one or more farm irrigation wells, then the District can mitigate the impact through one or more compensation schemes which are already in place within District policy.

GRRP Water Quality Analysis. The District receives its surface water supplies from one of three sources: the Kern River (KR), the Federal Central Valley Project (CVP) via the Friant - Kern canal (FK), and the California State Water Project (SWP) via the California Aqueduct (AQ).

The Kern River brings an average 772,800 af/yr of Sierran snowmelt runoff water into Kern County at an average TDS of 88 mg/l. The Friant-Kern Canal brings an average 395,000 af/yr of Sierran snowmelt runoff water from the Federal CVP into Kern County at an average TDS of 41 mg/l. The California Aqueduct brings an average 807,500 af/yr of Northern California snowmelt runoff water from the State SWP into Kern County at an average TDS of334 mg/l. The constituents of concern to the local community including arsenic, nitrate, and alpha emitters are at low levels and less than their respective MCLs in each of these three surface- water sources.

The TDS content of the SWP water which arrives in Kern County via the aqueduct varies significantly but predictably. During climatic dry cycles such as the years 1991 - 1995, the average annual TDS (344 mg/l) is approximately 170% higher than the TDS during climatic wet cycles (208 mg/l) such as the years 1996 - 2000. Within any given year, the average monthly TDS in the winter months is consistently 150% - 190% higher than the TDS in the summer months. We do not see a comparable variability in the FK or KR waters.

We find that the overall District surface water supply is very good quality, even during periods of elevated TDS in the aqueduct. The total dissolved solids contents are quite low, the physical properties are acceptable, suspended solids, if present, can be eliminated by settling or filtration, and the trace occurrences of constituents of concern (COCs) are below MCLs and, so far, of minor concern.

The TDS content of the aquifer underlying the general GRRP project- area- of- interest ranges from 500 to more than 3,000 mg/l. The constituents of concern within the aquifer are found to broadly occur at concentrations somewhat greater than those found in the surface waters.

We find that all surface waters which might be stored in the aquifer under the District have lower TDS contents and lower COC concentrations than the naturally-occurring waters within the aquifers. The recharge of lower- TDS content surface waters will have a basin- positive impact of reducing the TDS content of the underlying aquifers.

Based on all possible blending scenarios, we find that a volumetrically- balanced GRRP will have the net effect of reducing the average TDS content and reducing the COC concentrations within the aquifers in the project area. If the GRRP operates in positive or neutral balance as proposed (according to the fundamental banking principle), then the GRRP water quality impact will be basin- positive and the District- wide water quality impact will continue to be basin- positive as well.